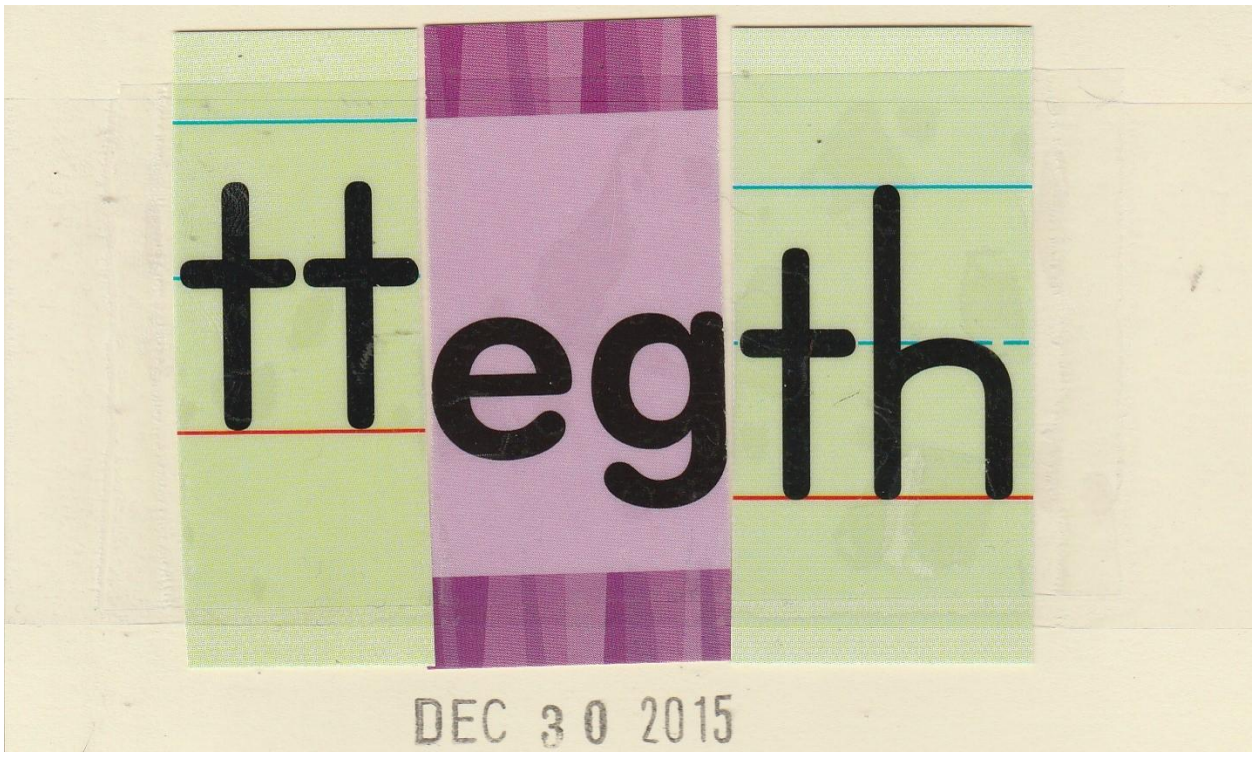
Jim Leftwich Vispo 2015 Ongoing Research Volume 13



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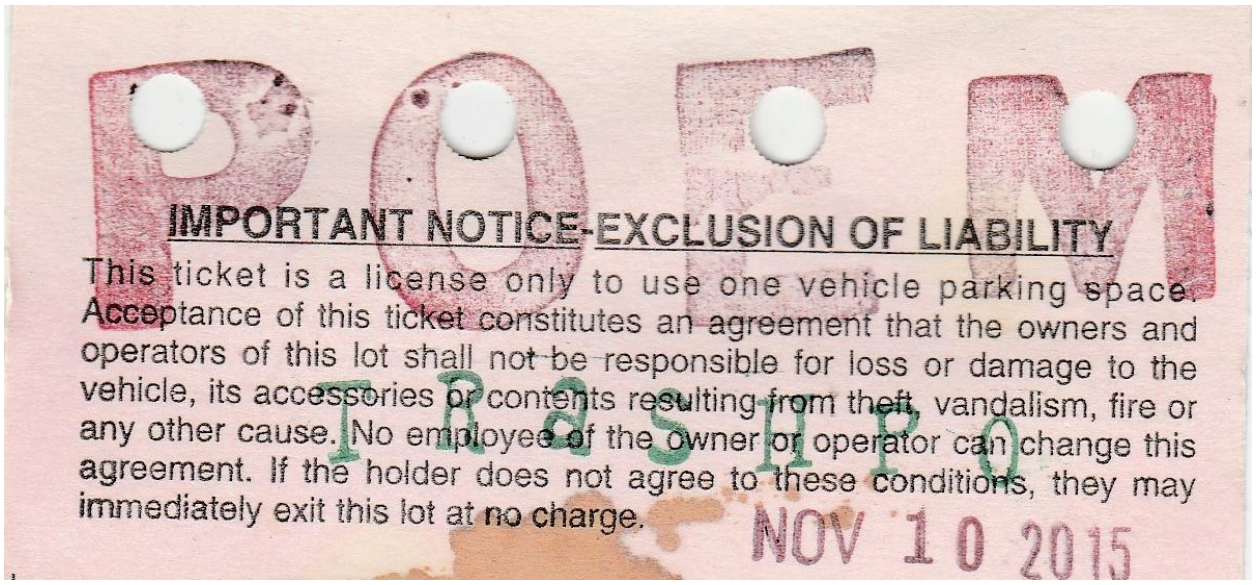

IMPORTANT NOTICE-EXCLUSION OF LIABILITY

This ticket is a license only to use one vehicle parking space. Acceptance of this ticket constitutes an agreement that the owners and operators of this lot shall not be responsible for loss or damage to the vehicle, its accessories or contents resulting from theft, vandalism, fire or any other cause. No employee of the owner or operator can change this agreement. If the holder does not agree to these conditions, they may immediately exit this lot at no charge.

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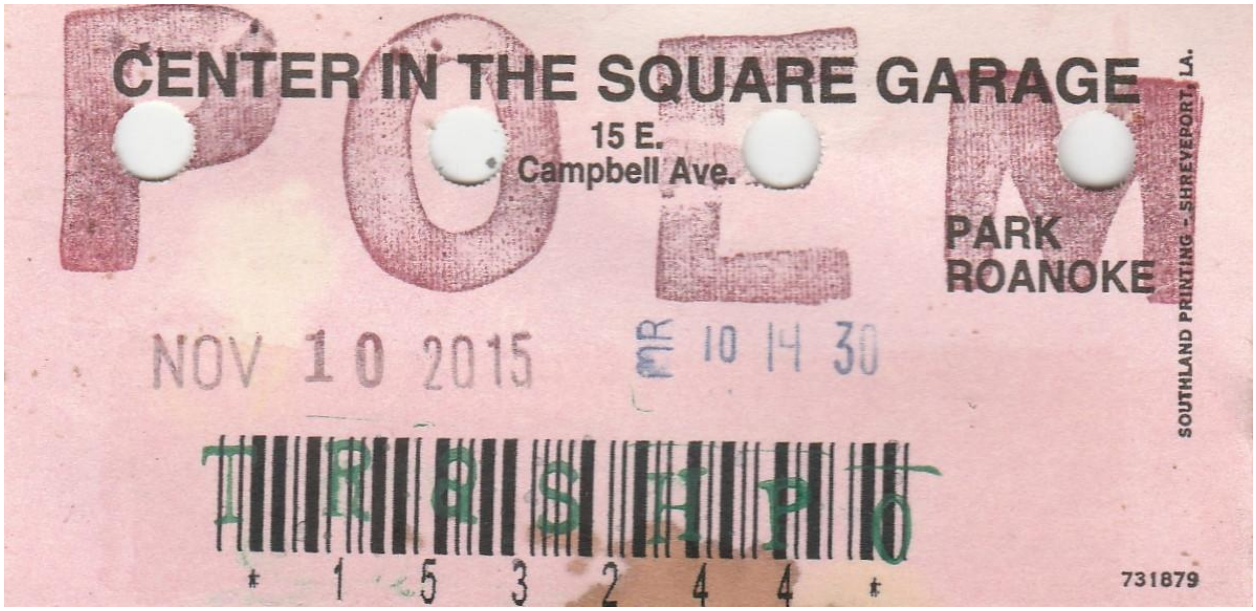

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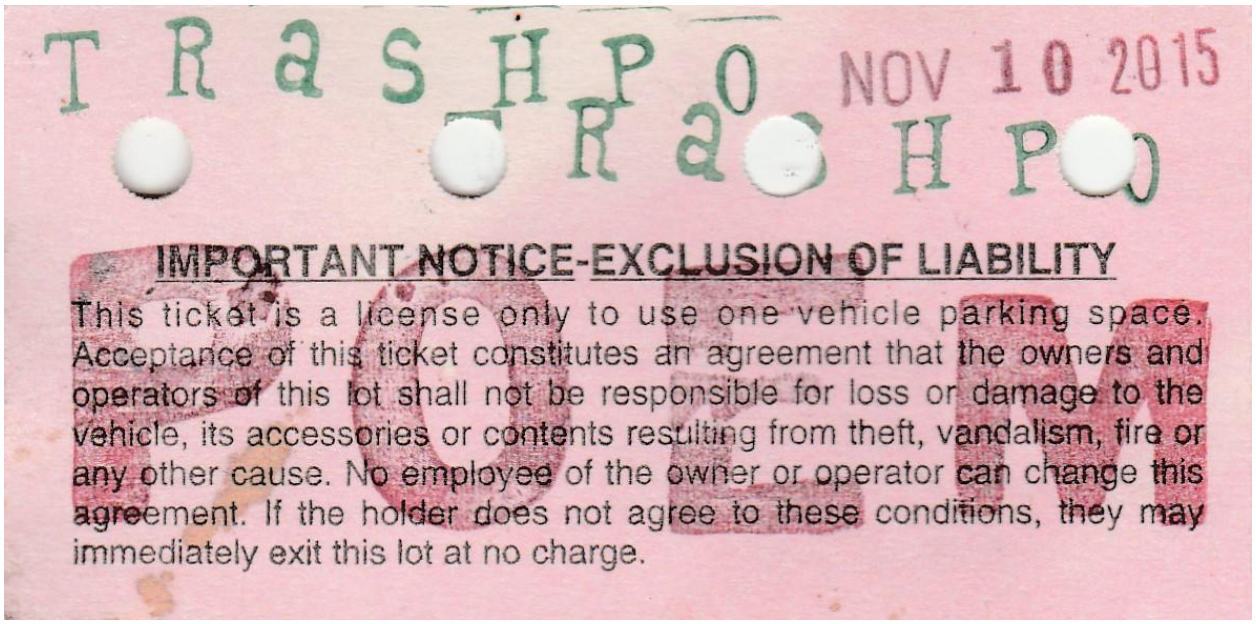
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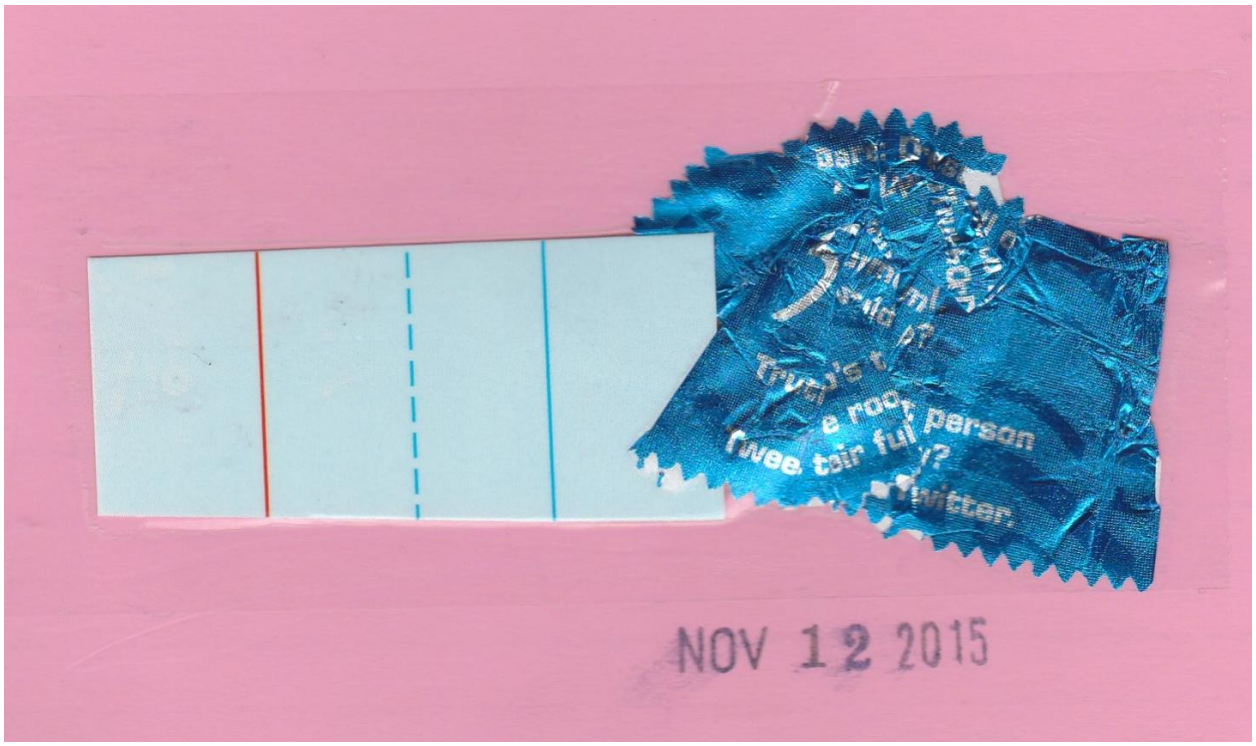
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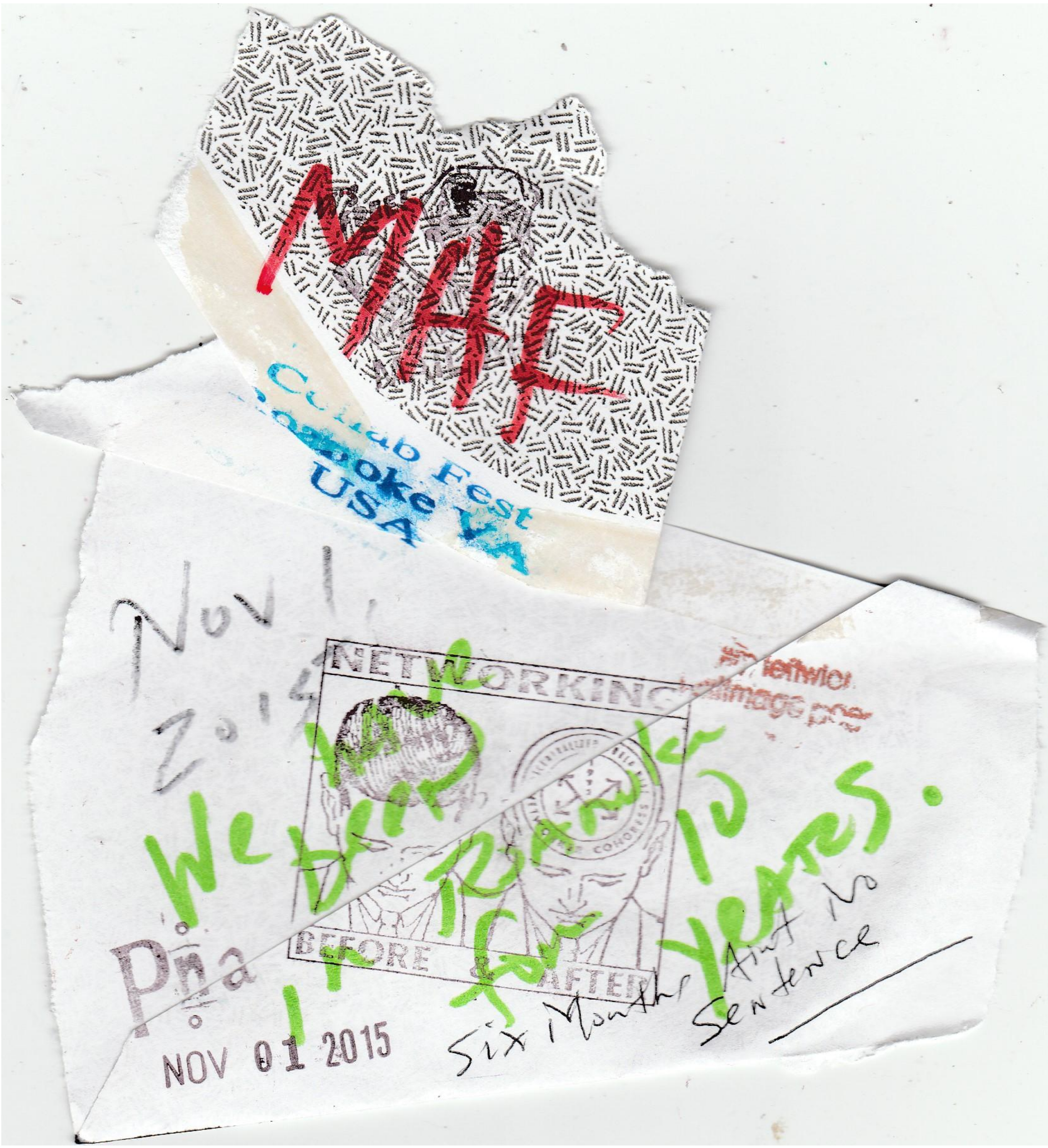
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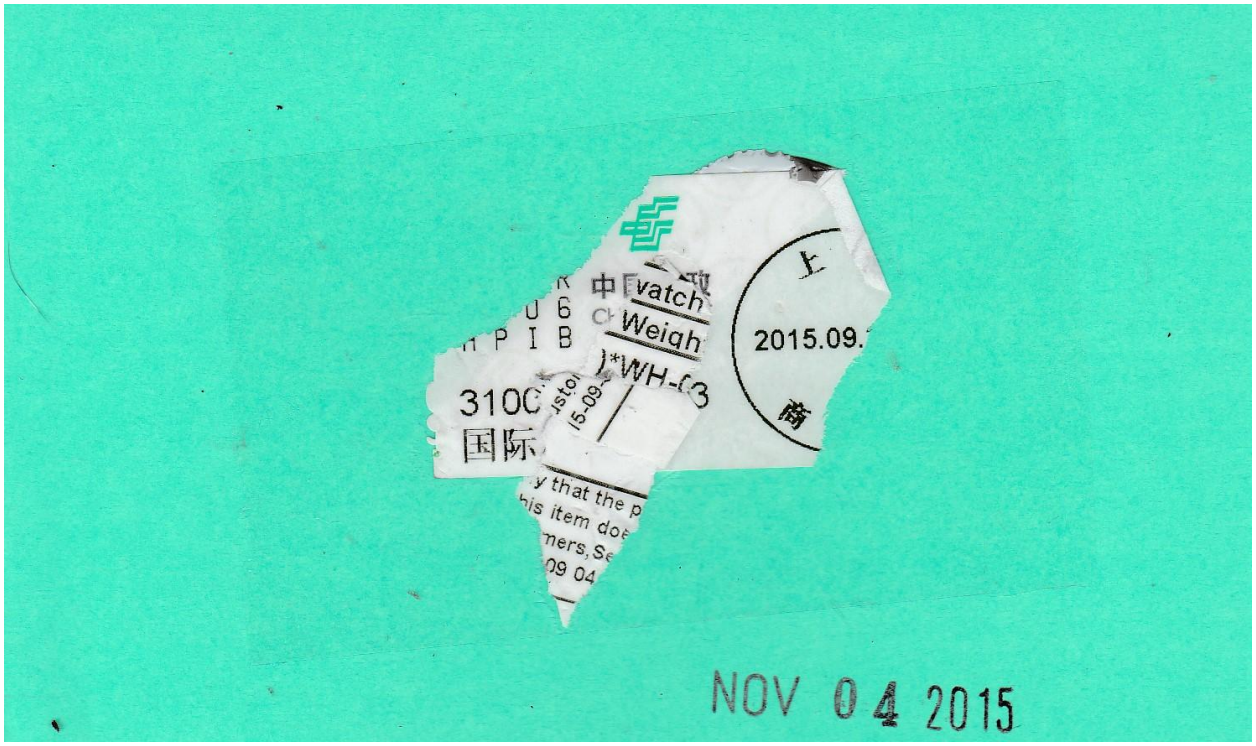
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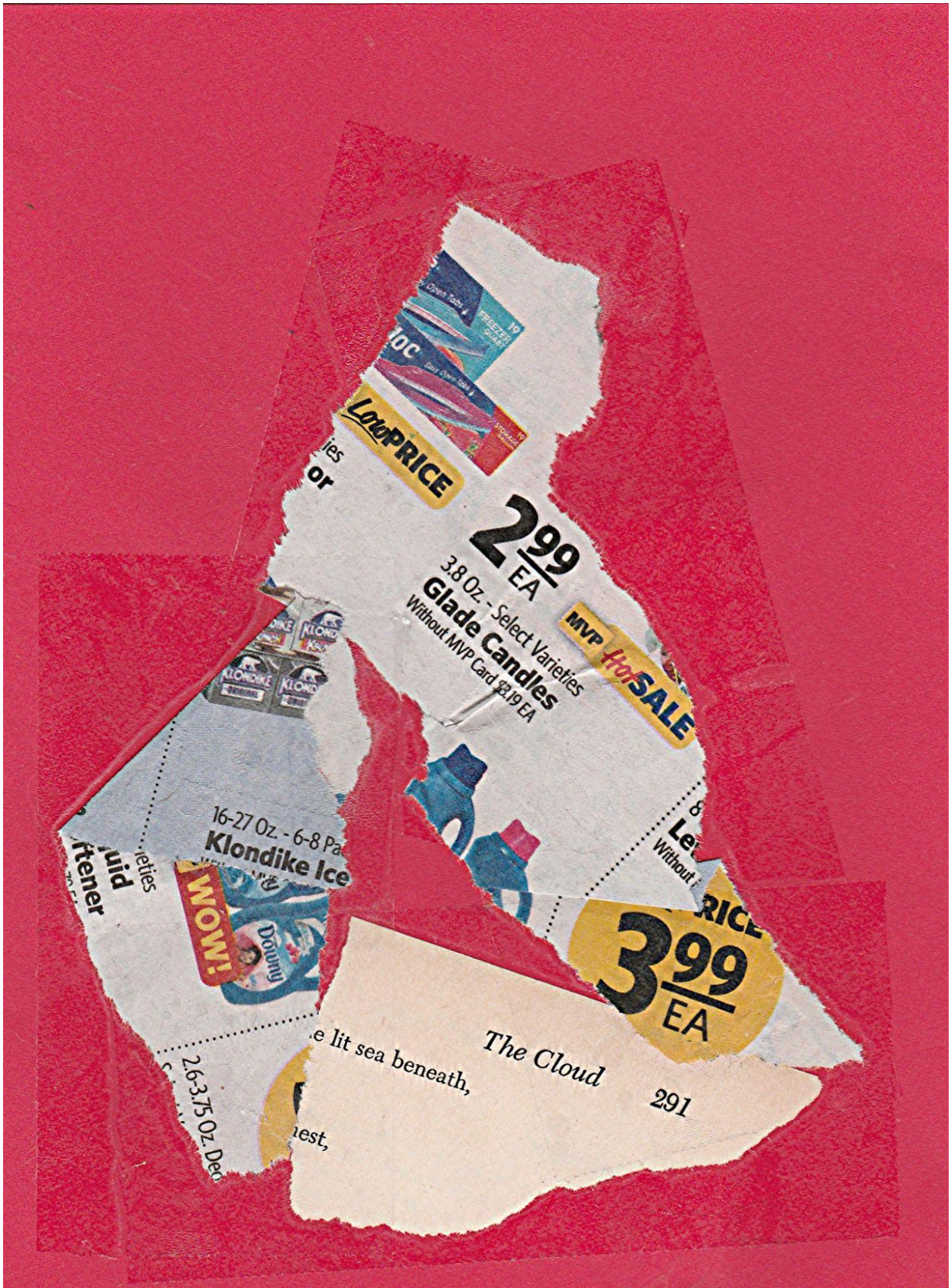

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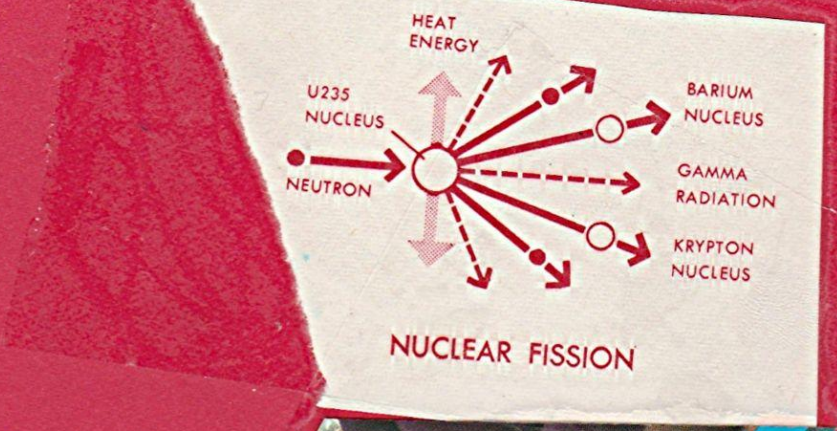

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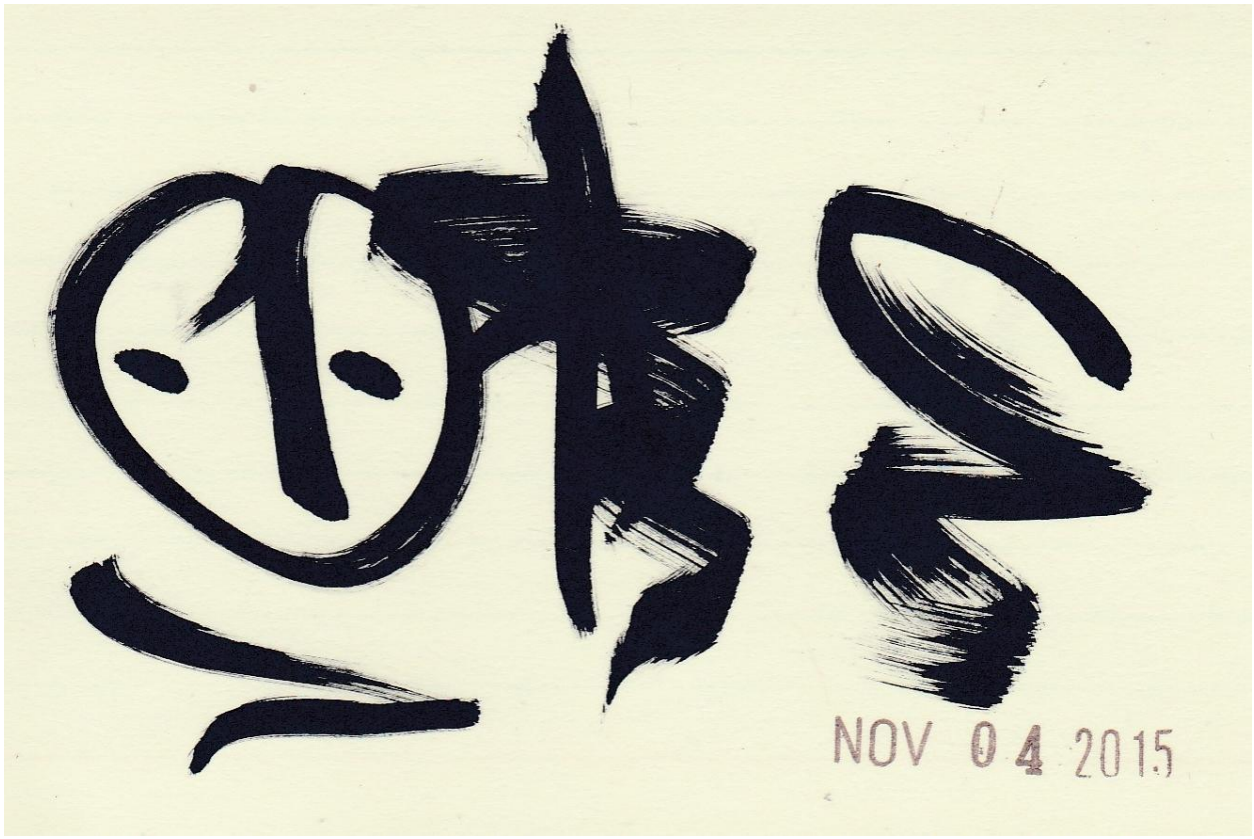
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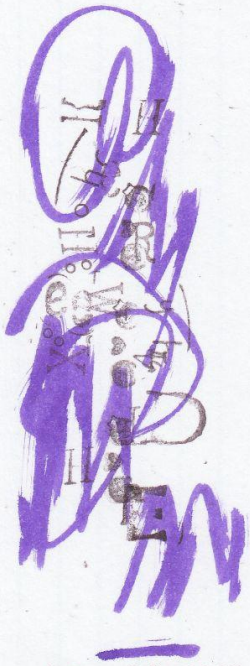
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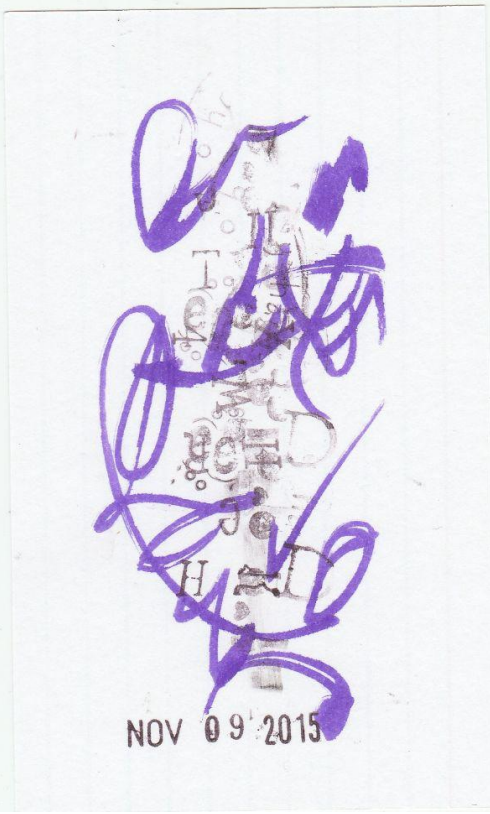
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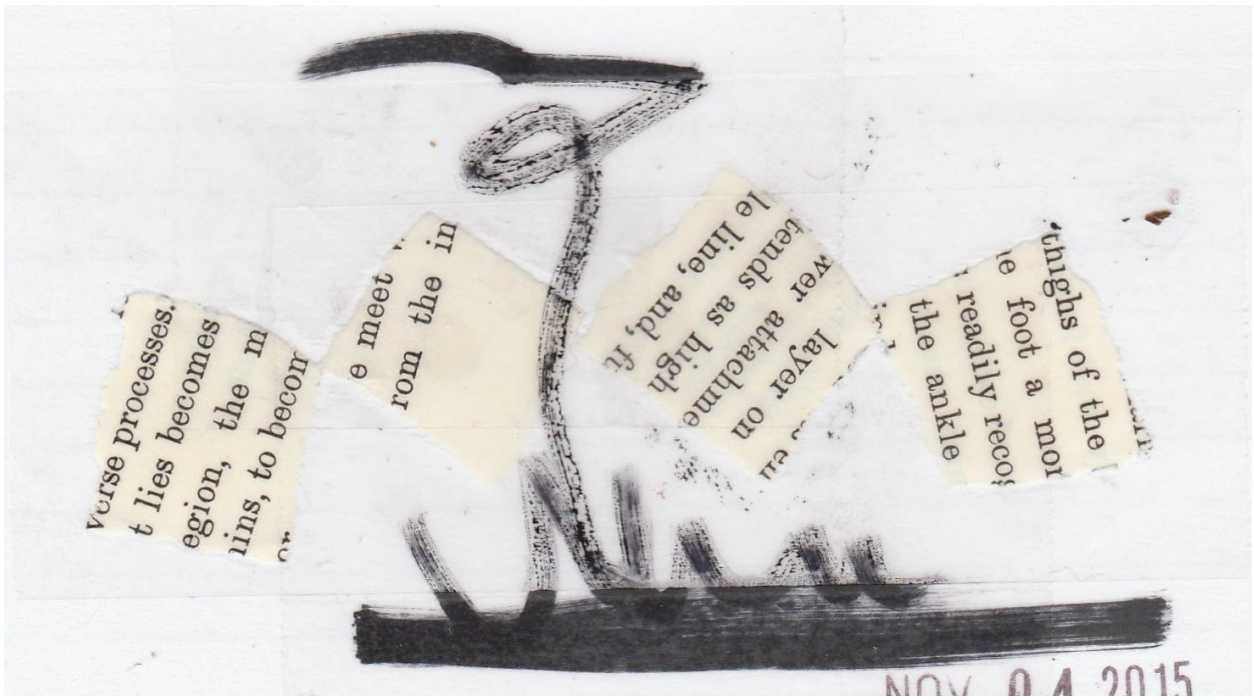

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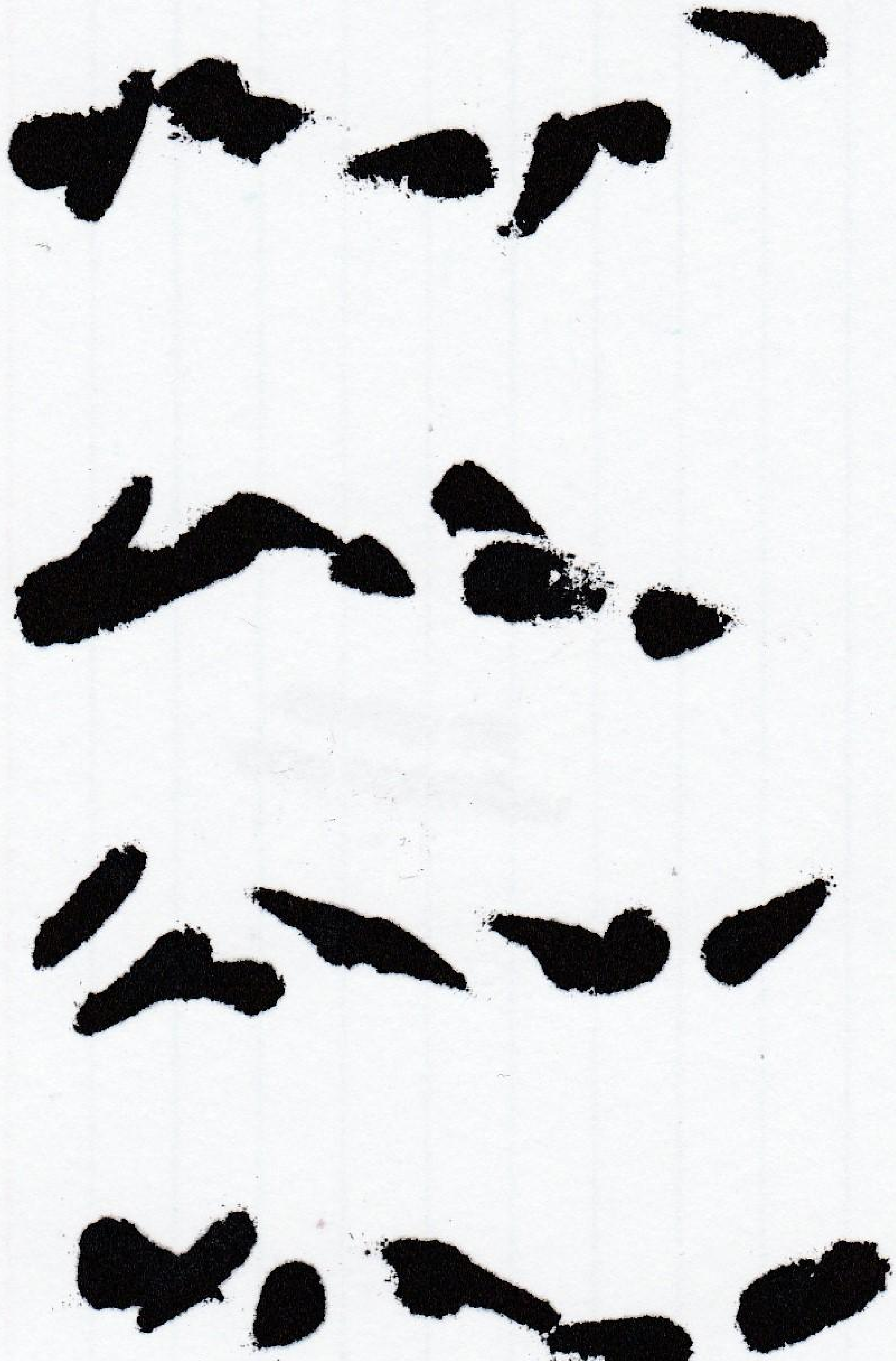

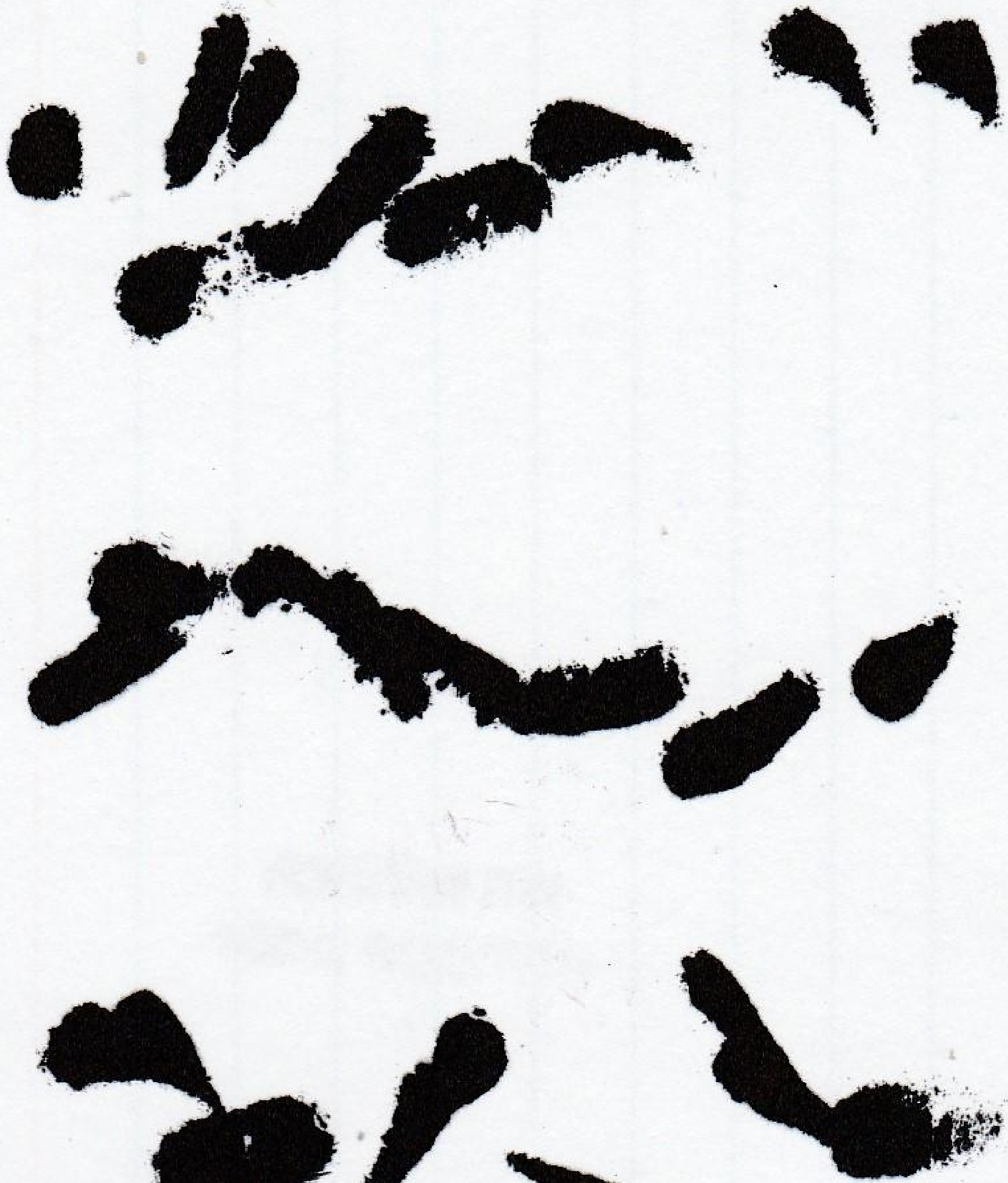

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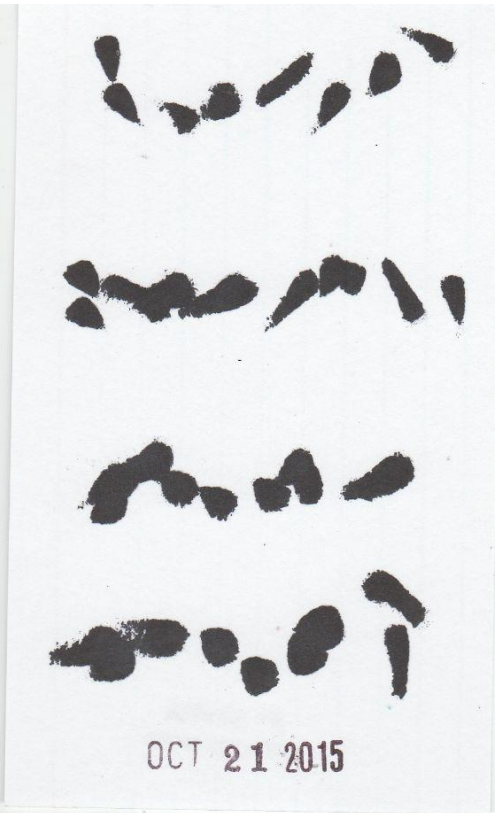

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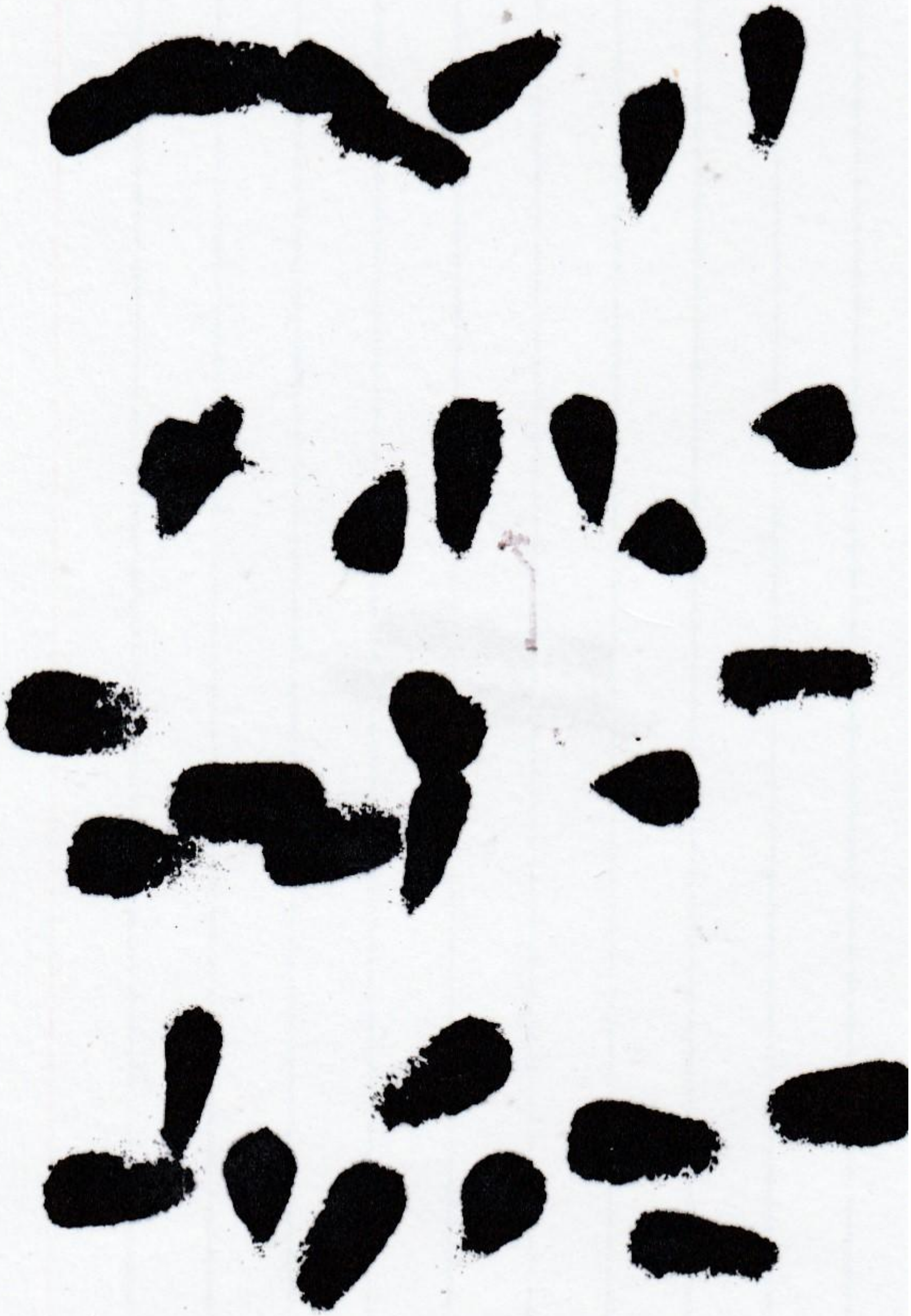

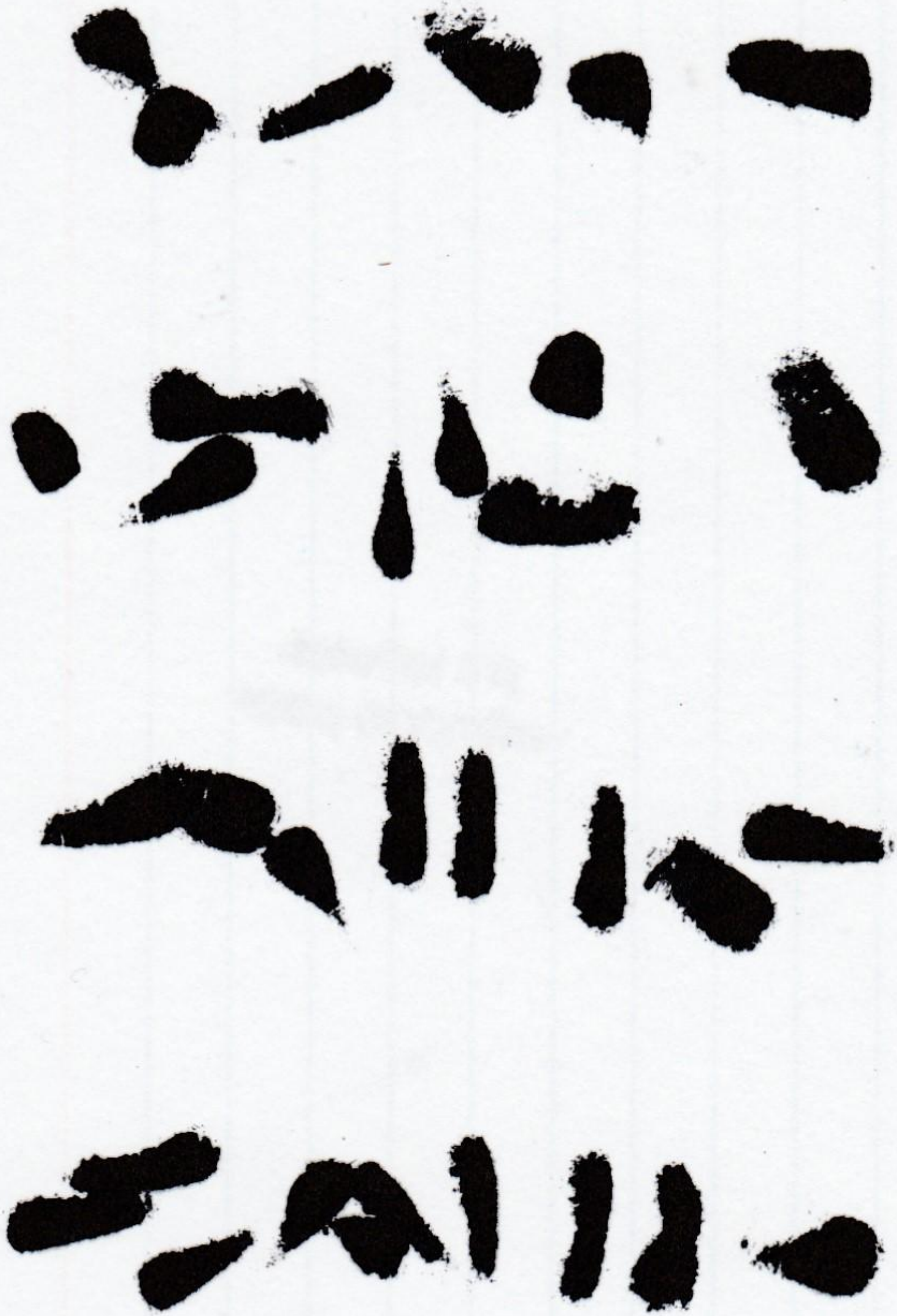


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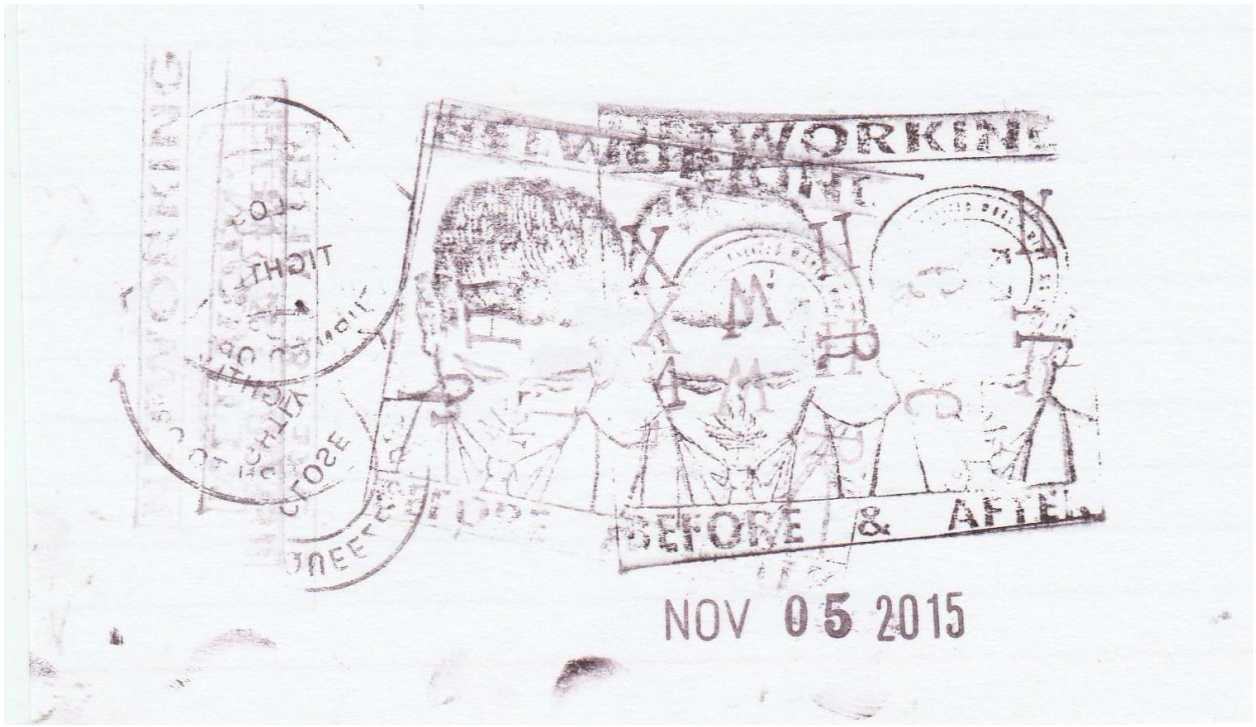
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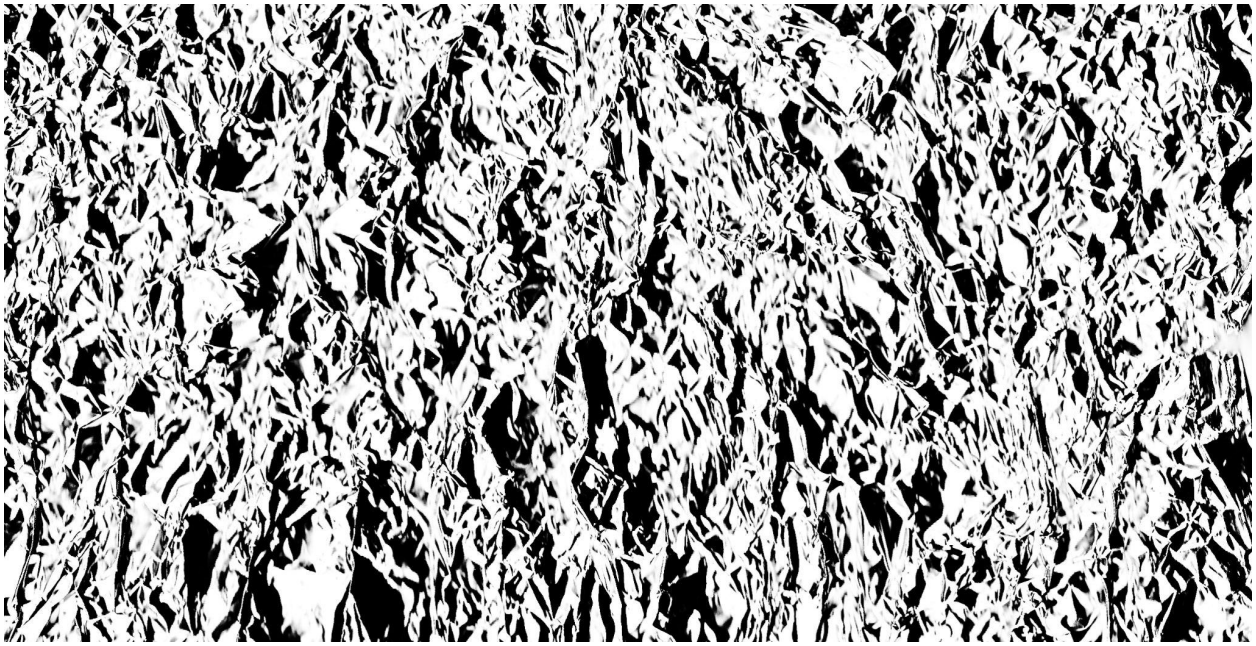

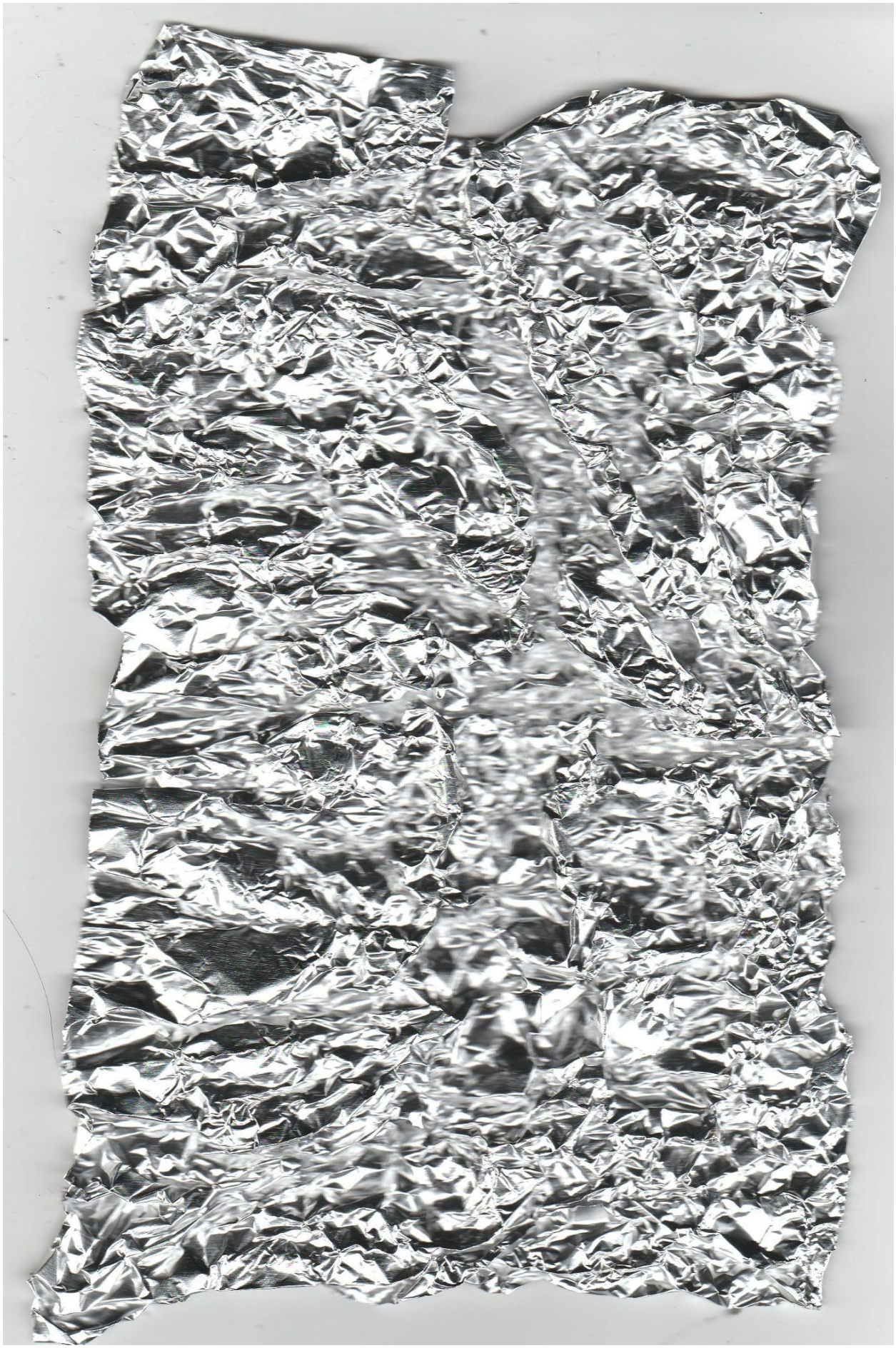

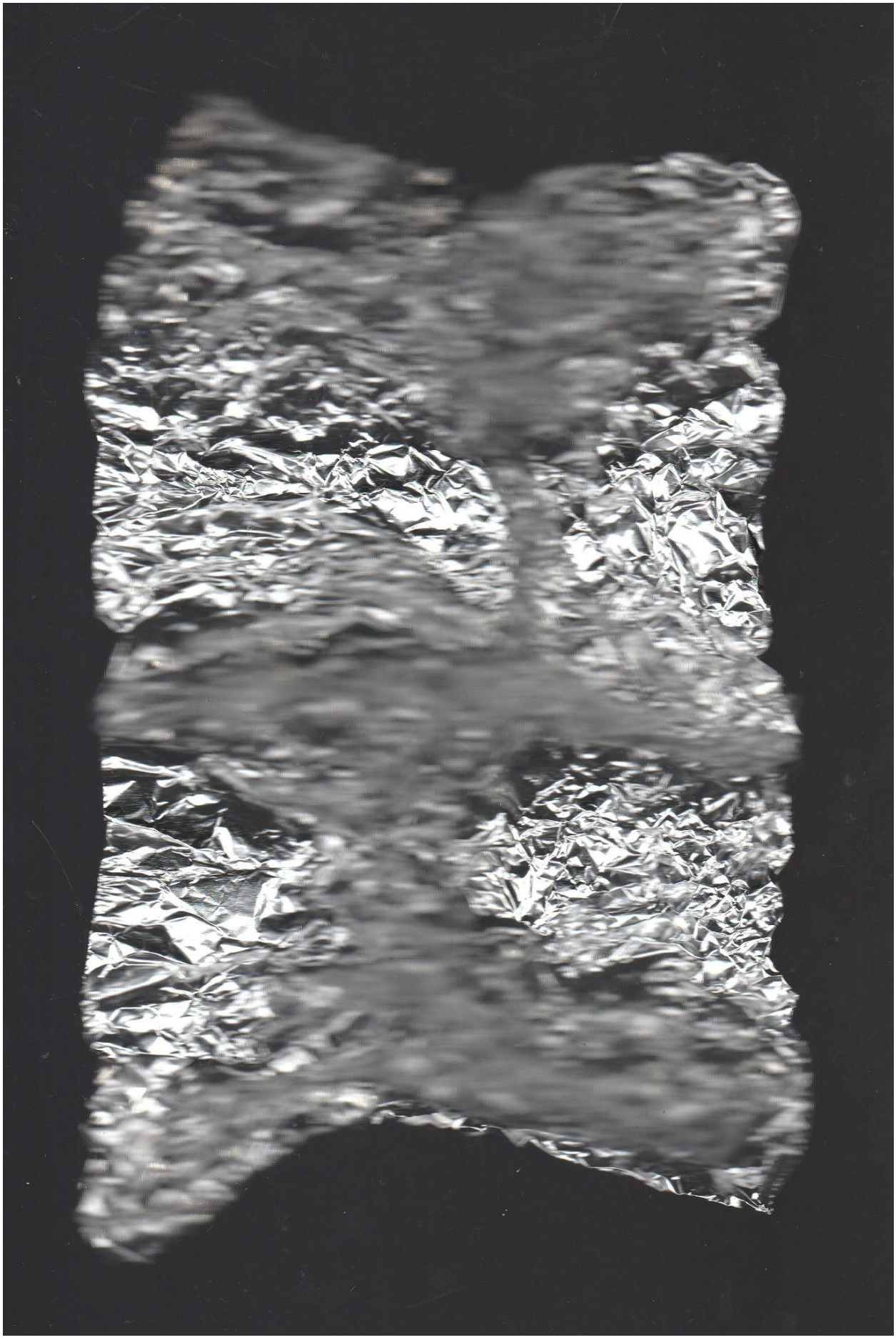

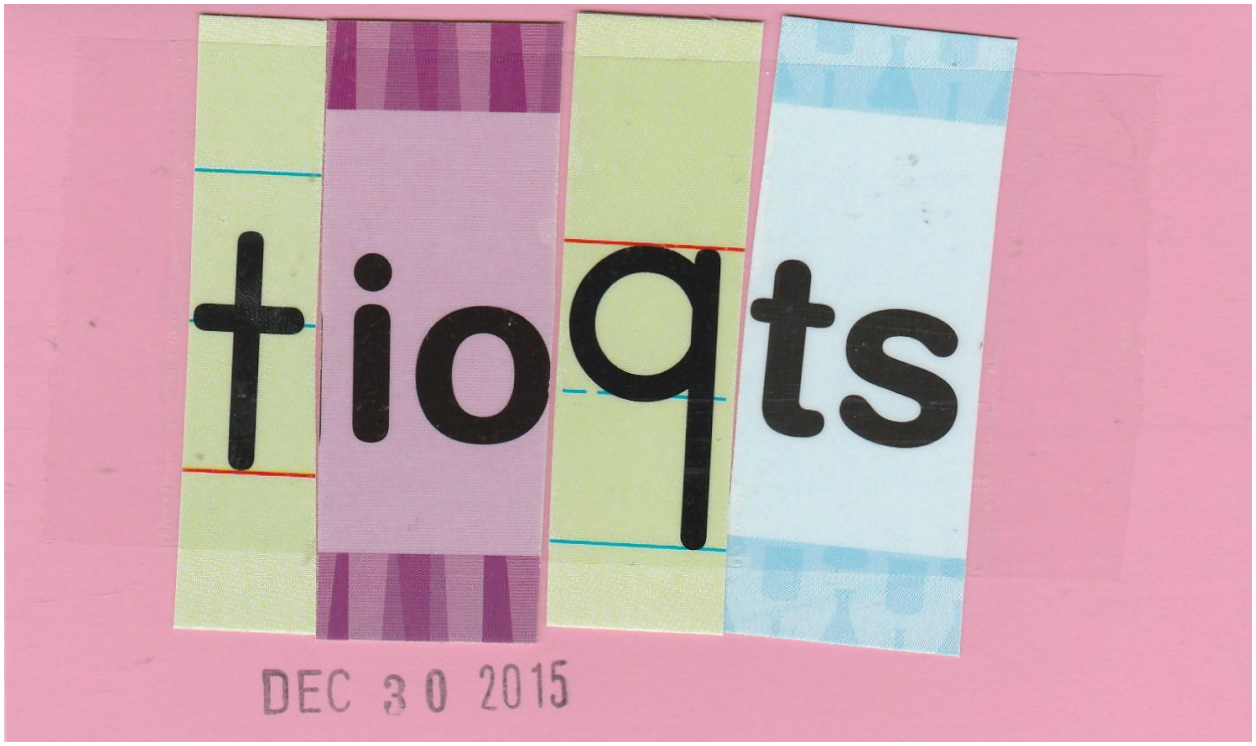
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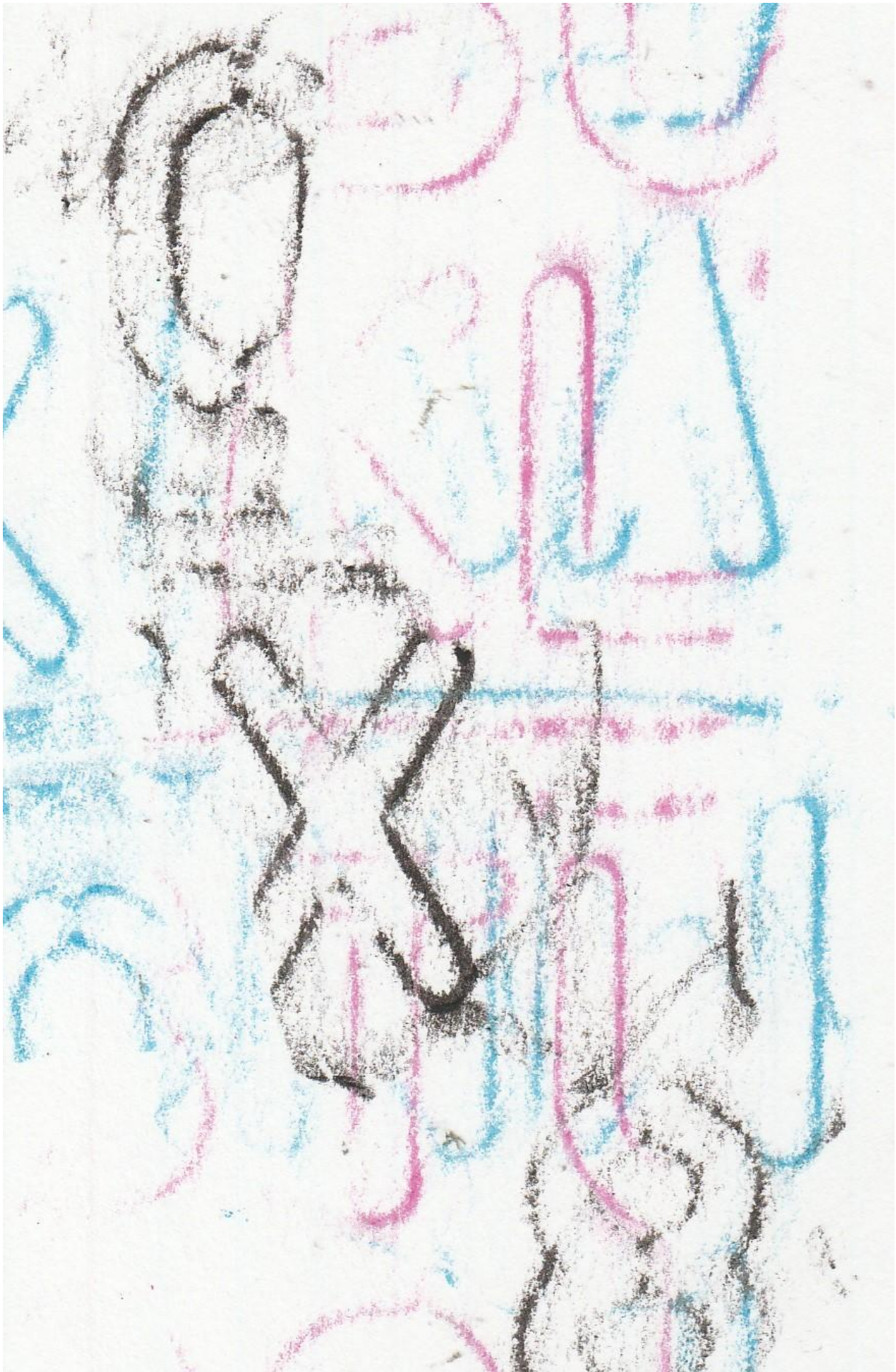

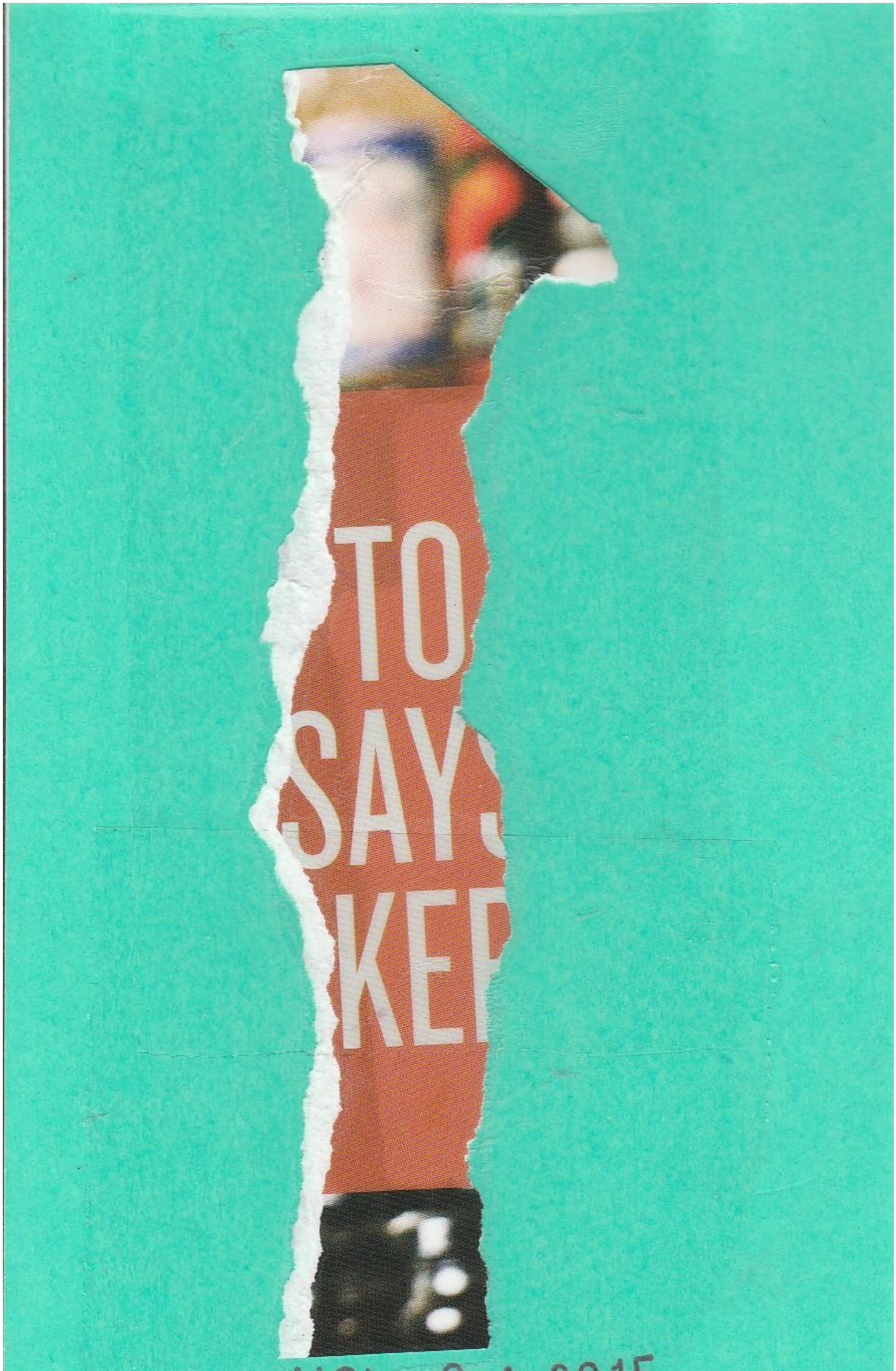
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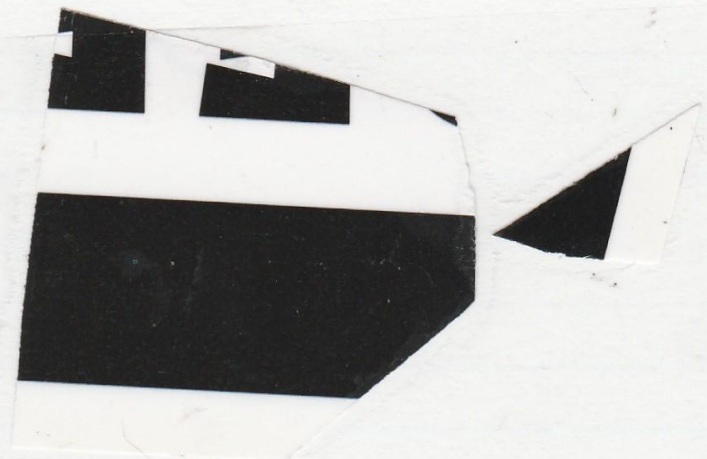


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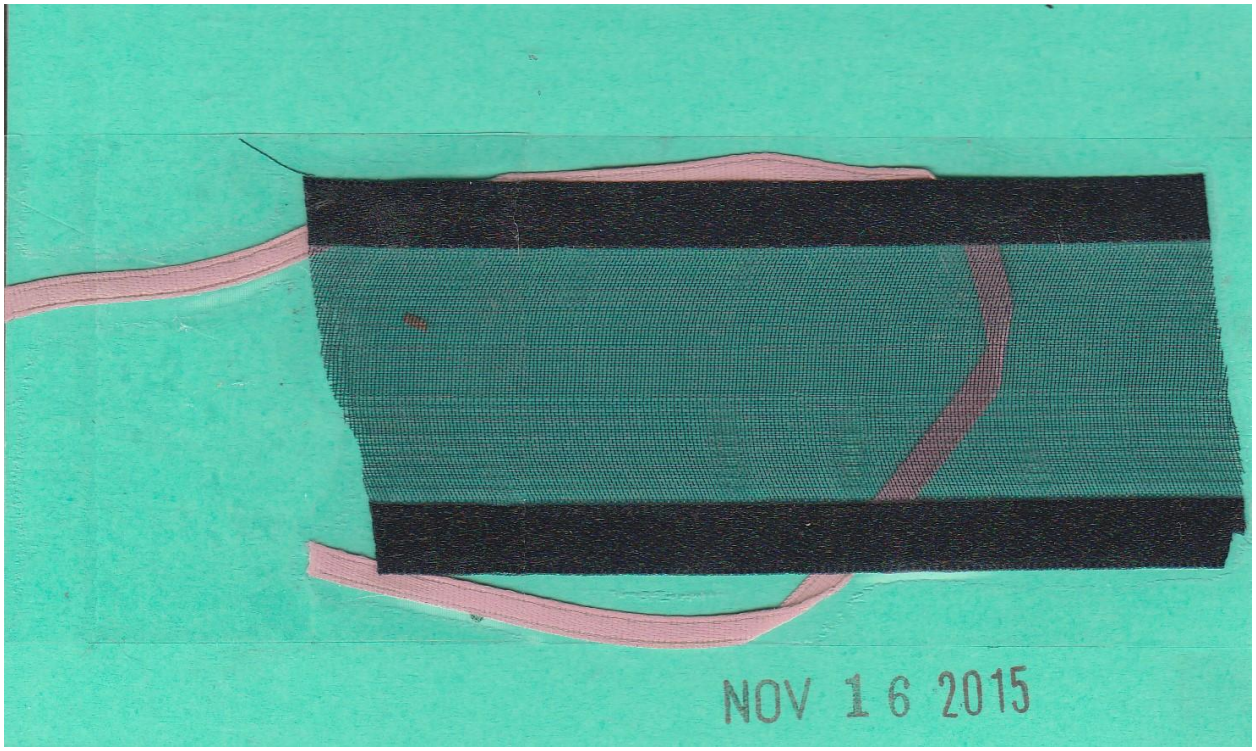
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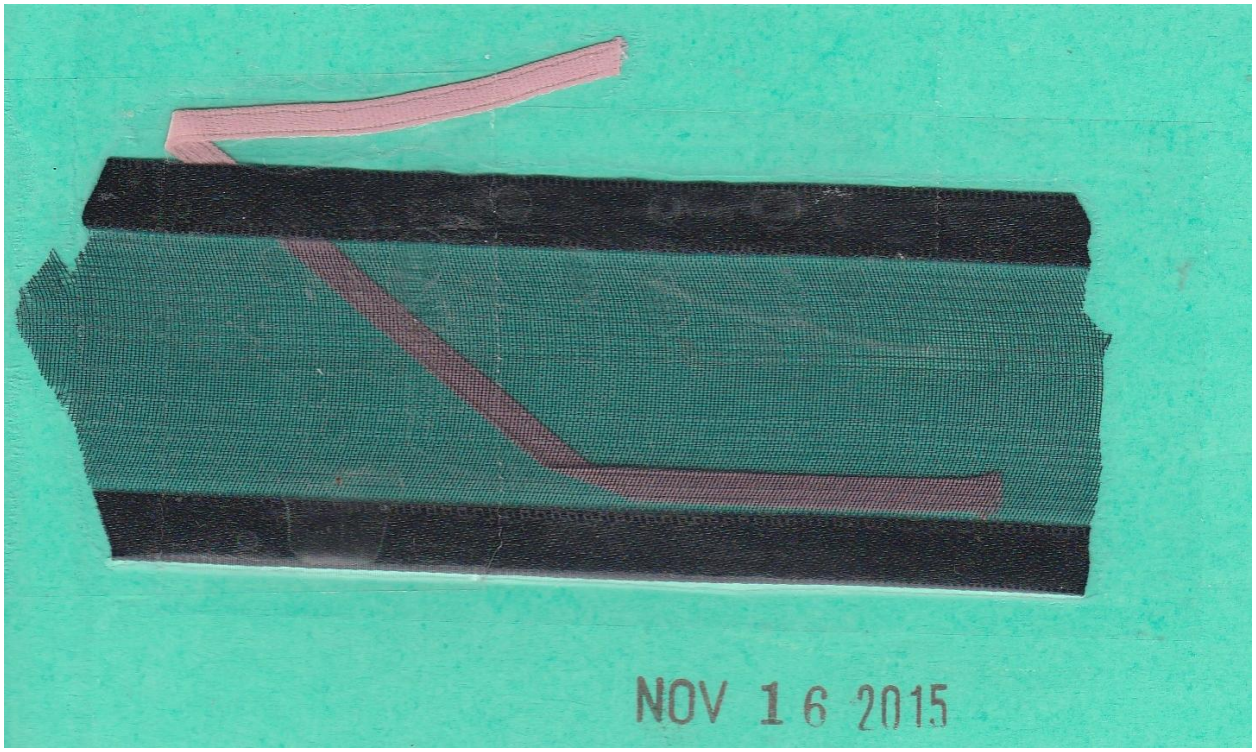
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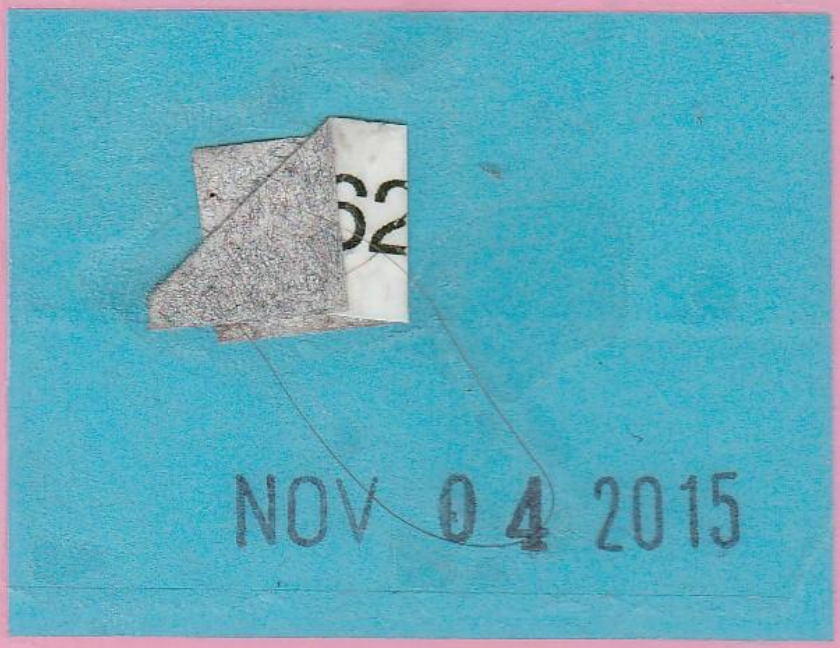

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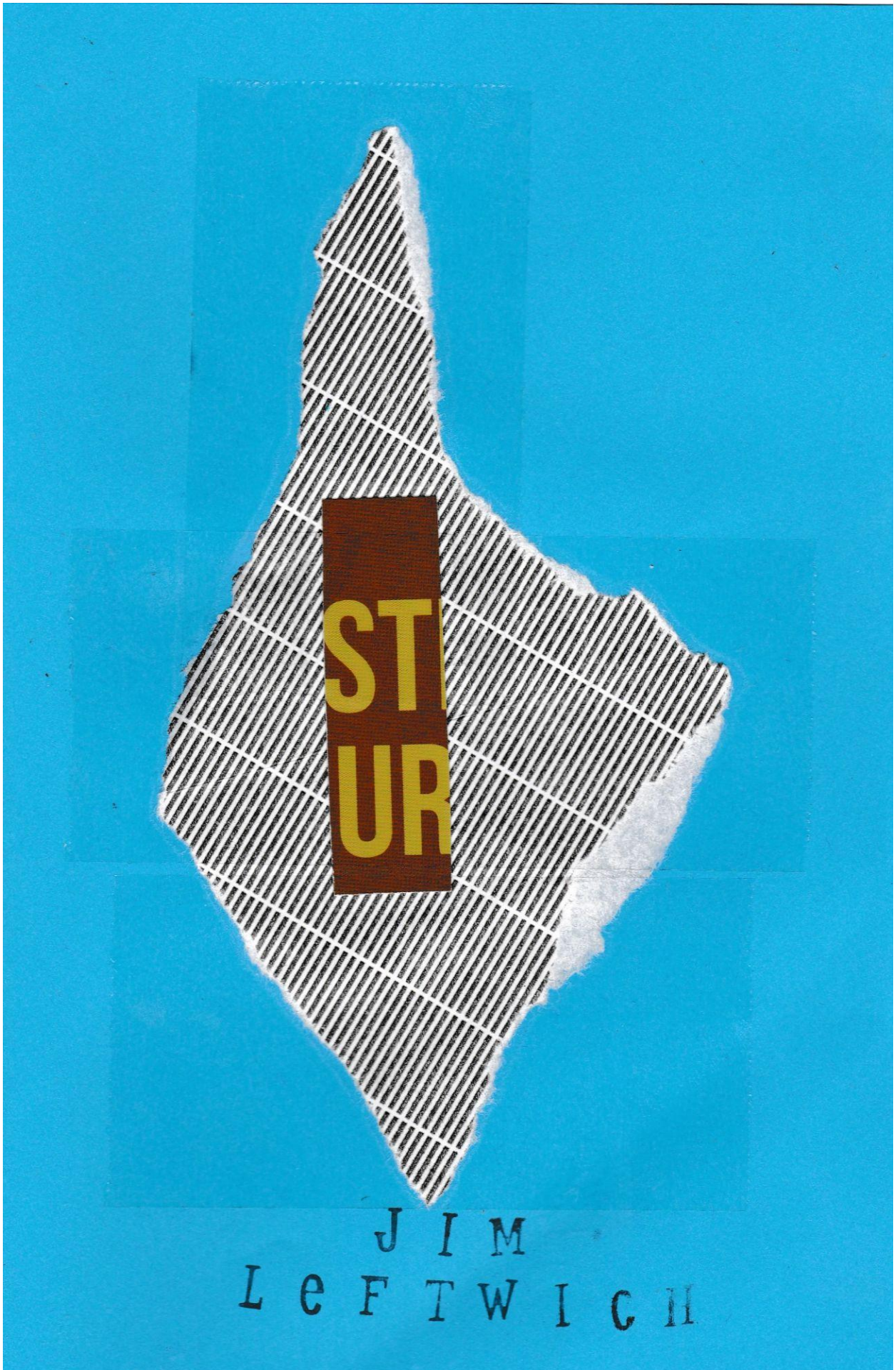
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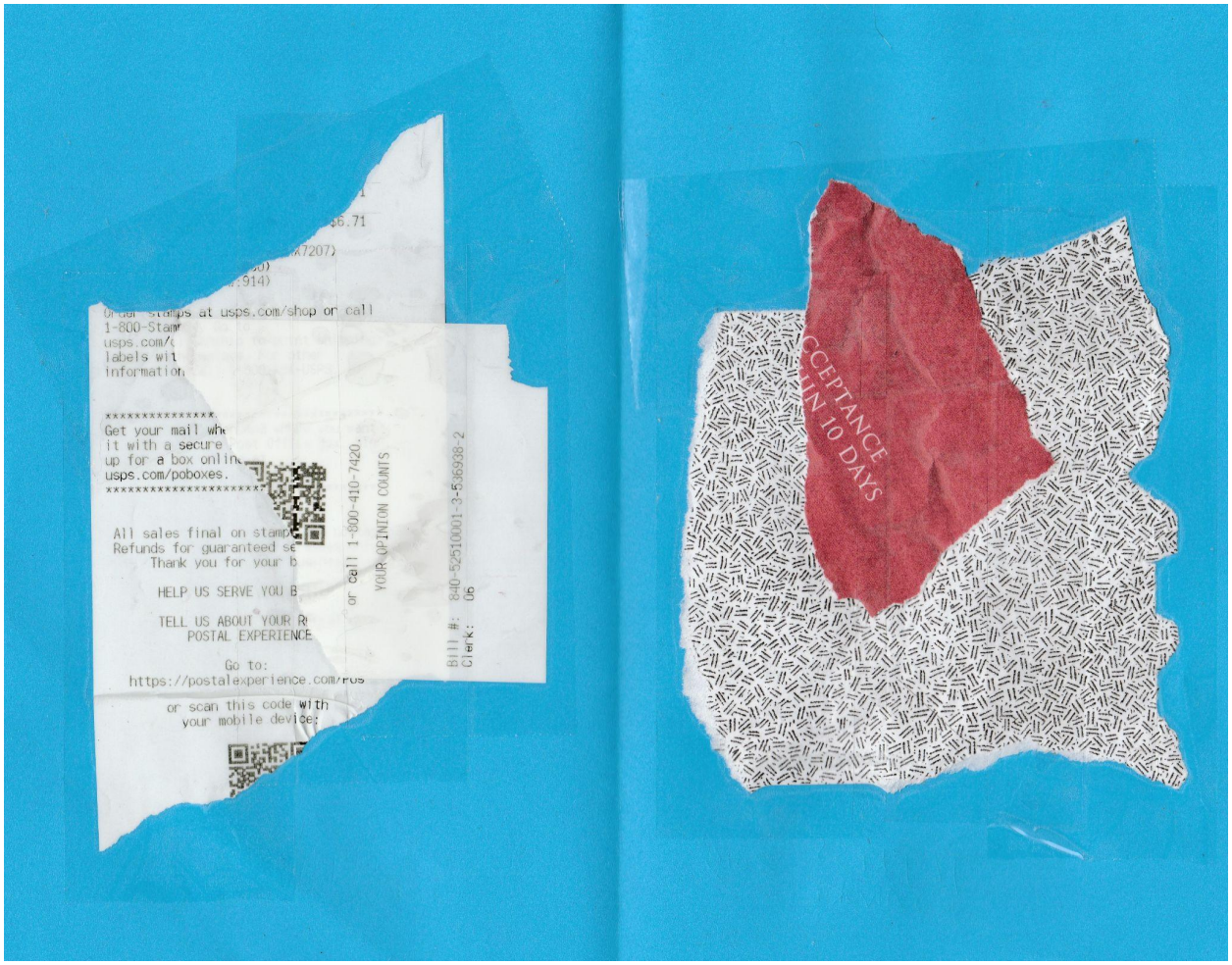
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Product Description	Sale Qty	Final Price
71c (Ndn) Eastern Tiger Swallowtail (Butterfly)PSA (Unit Price:$0.71)	1	$0.71
First-Class Mail Large Envelope (Domestic) (CHARLESTON, WV 25311) (Weight:0 Lb 1.60 Oz) (Expected Delivery Day) (Monday 11/02/2015)	1	$1.20
First-Class Mail Large Envelope (Domestic) (NEW YORK, NY 10012) (Weight:0 Lb 1.90 Oz) (Expected Delivery Day) (Monday 11/02/2015)	1	$1.20
(Global Forever) Evergreen Wreath PSA (Unit Price:$1.20)	3	$3.60
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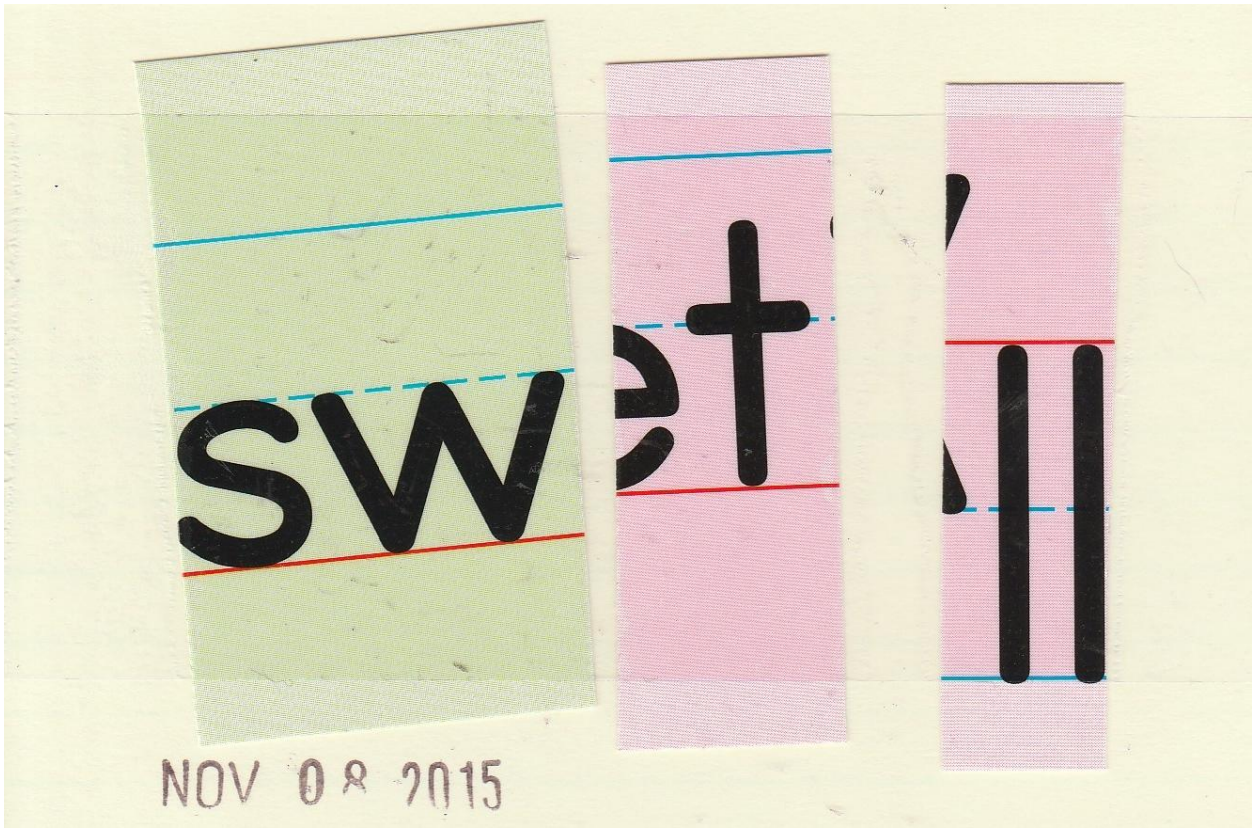
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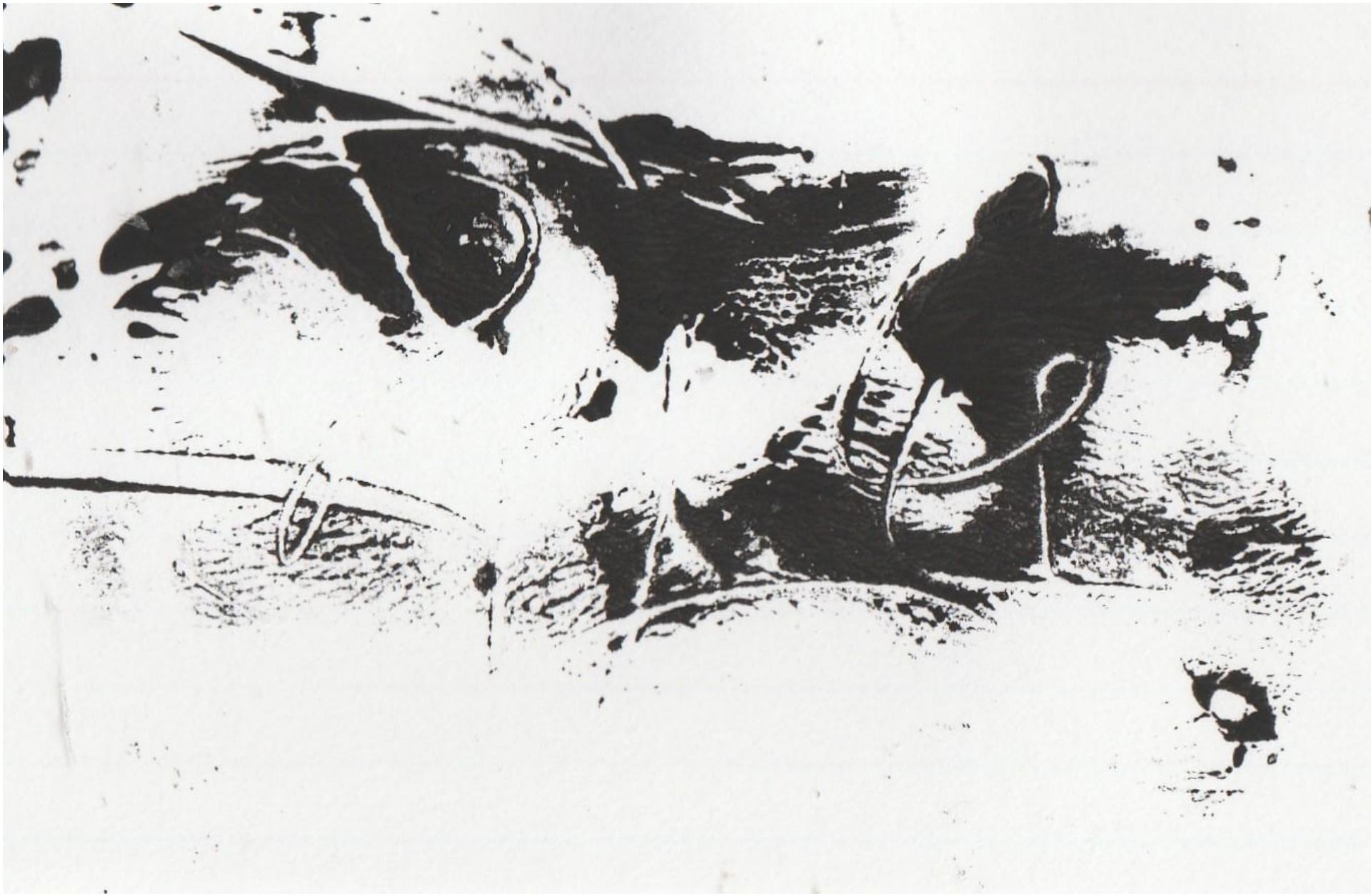


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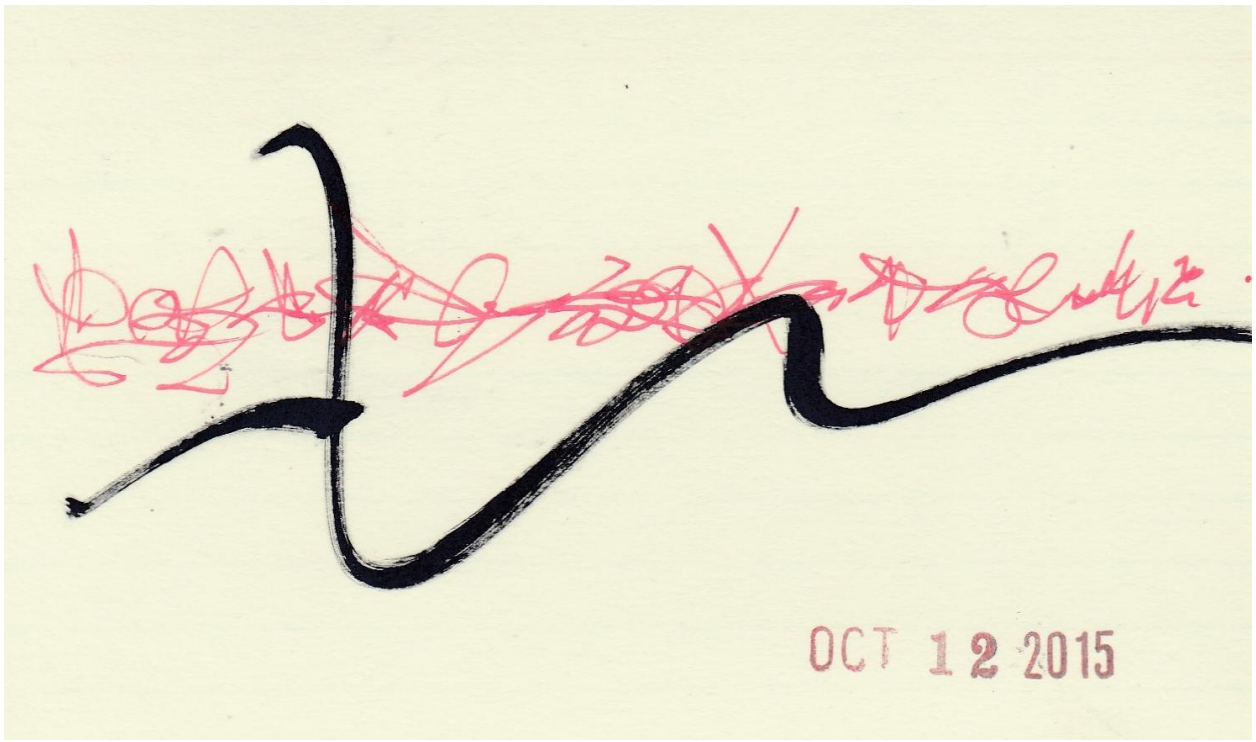
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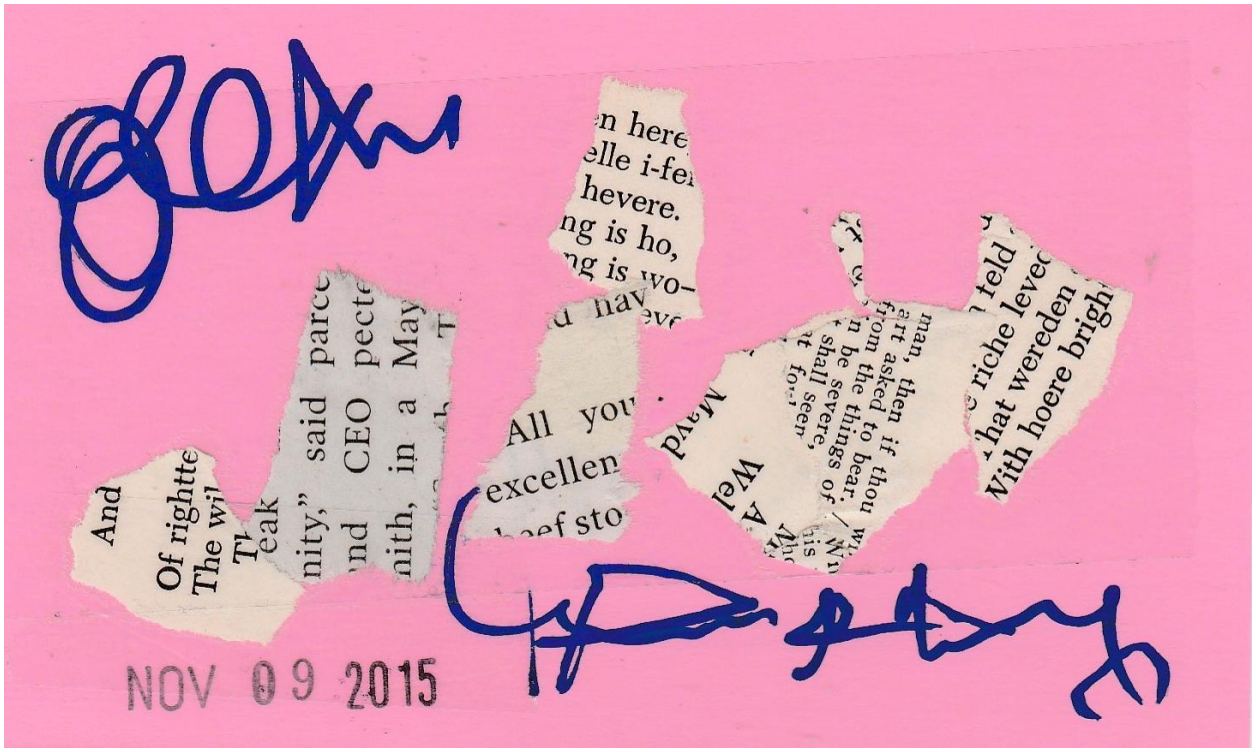
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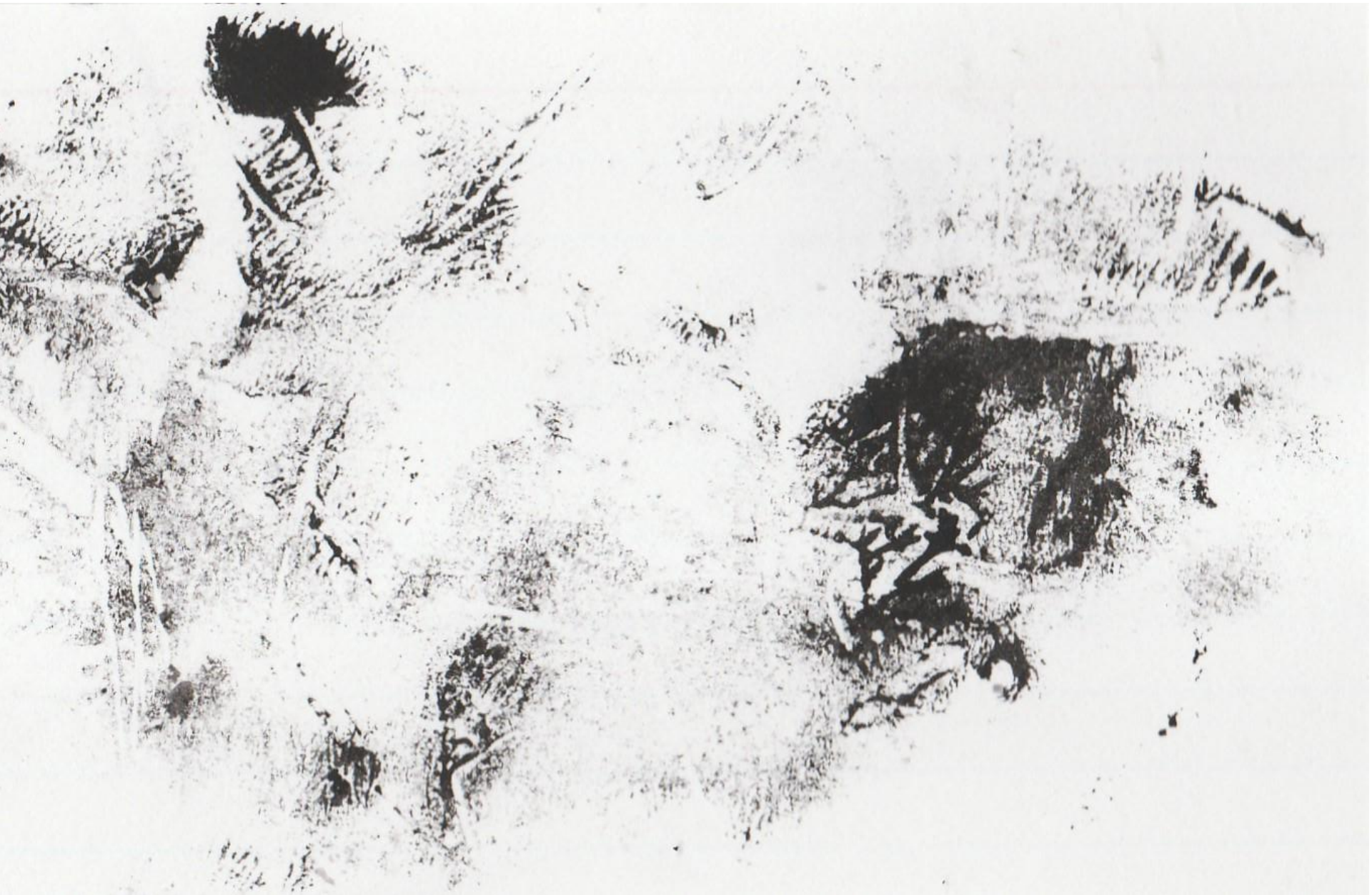

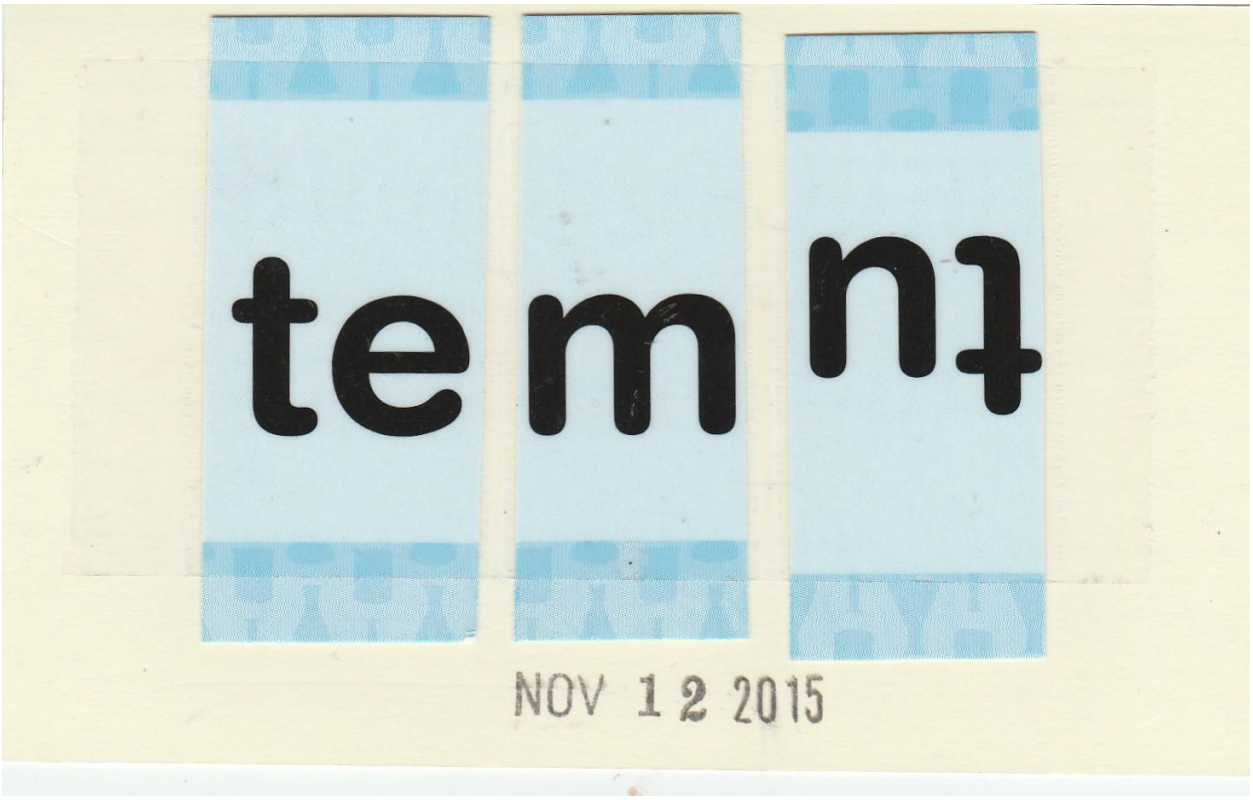
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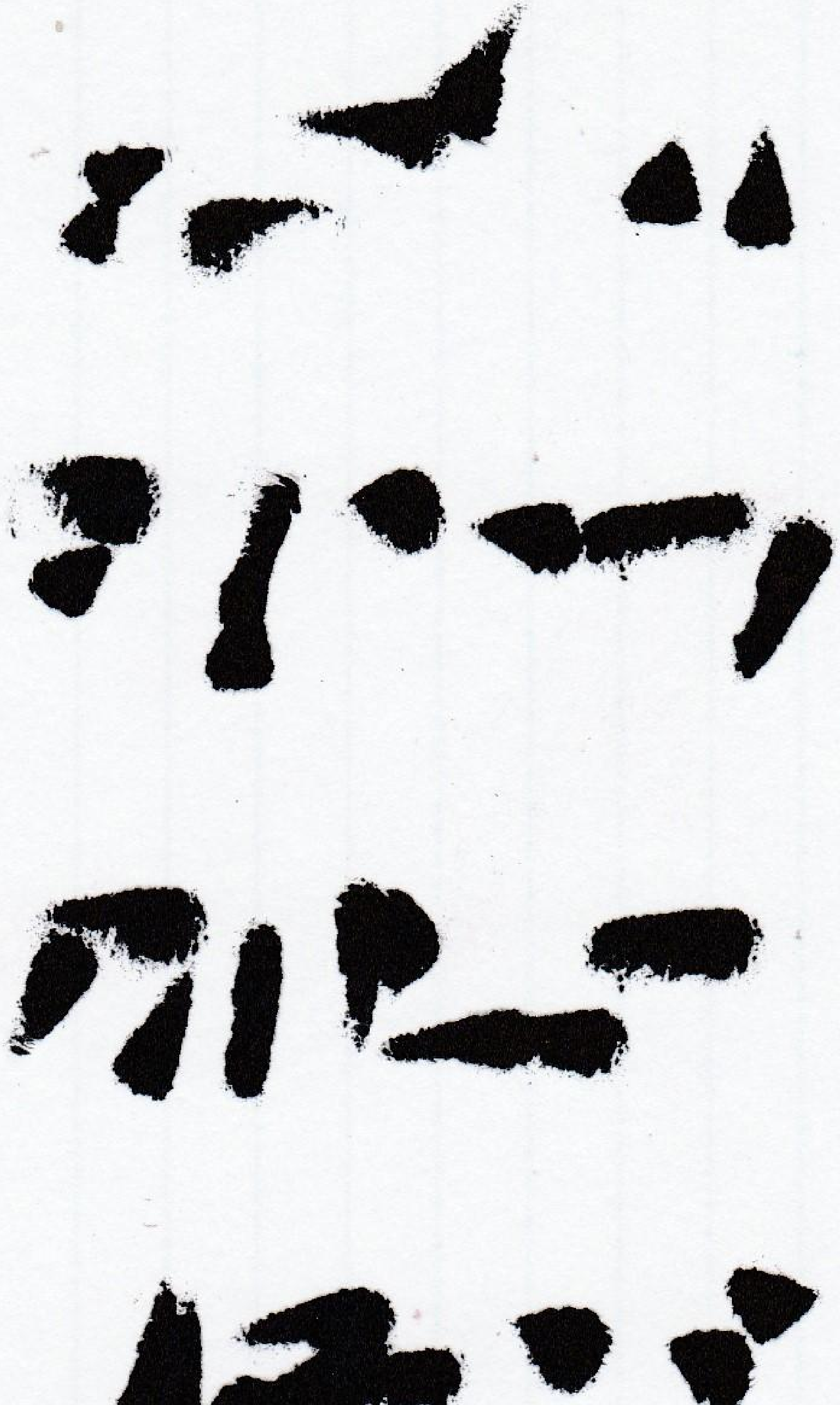

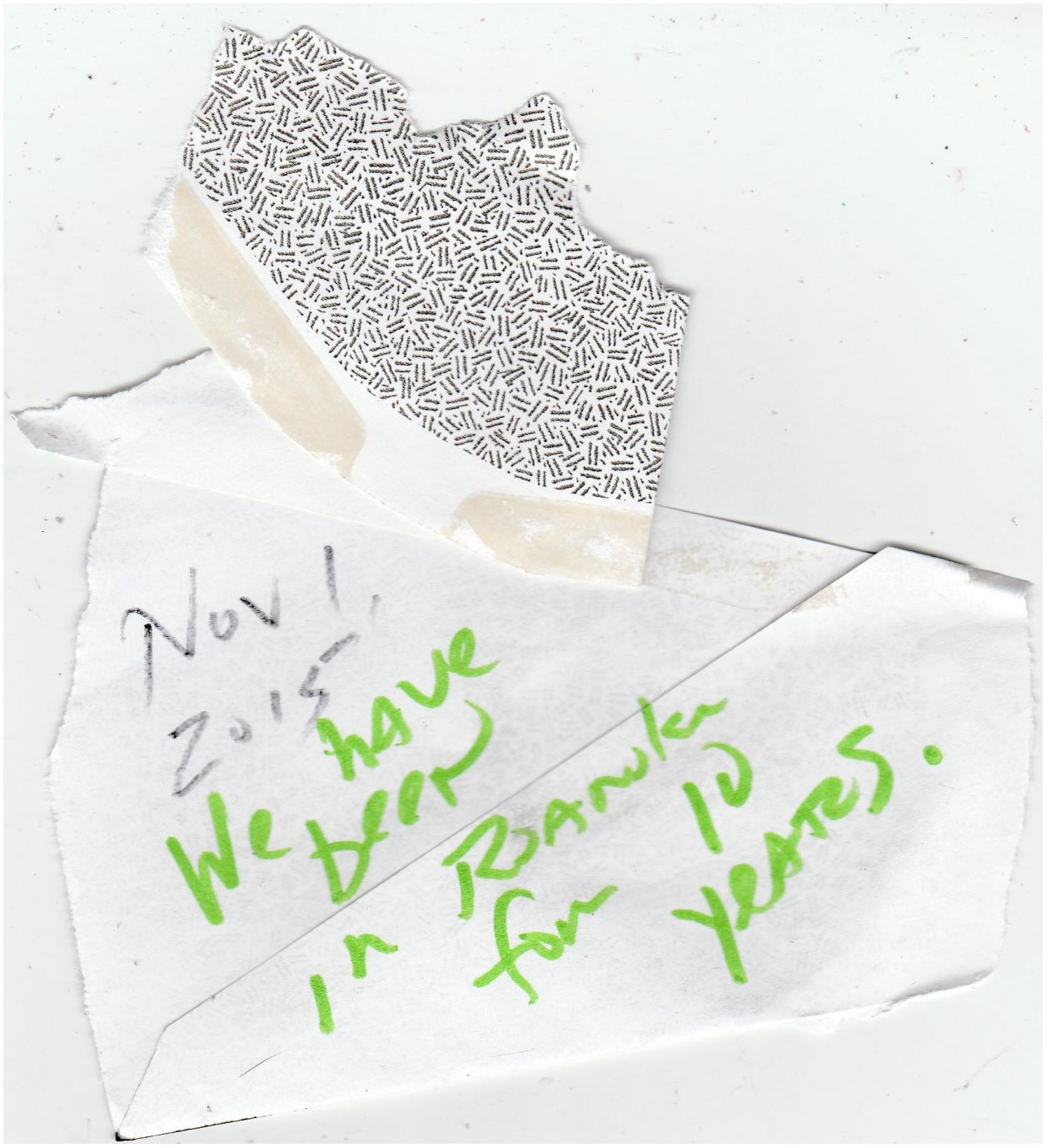
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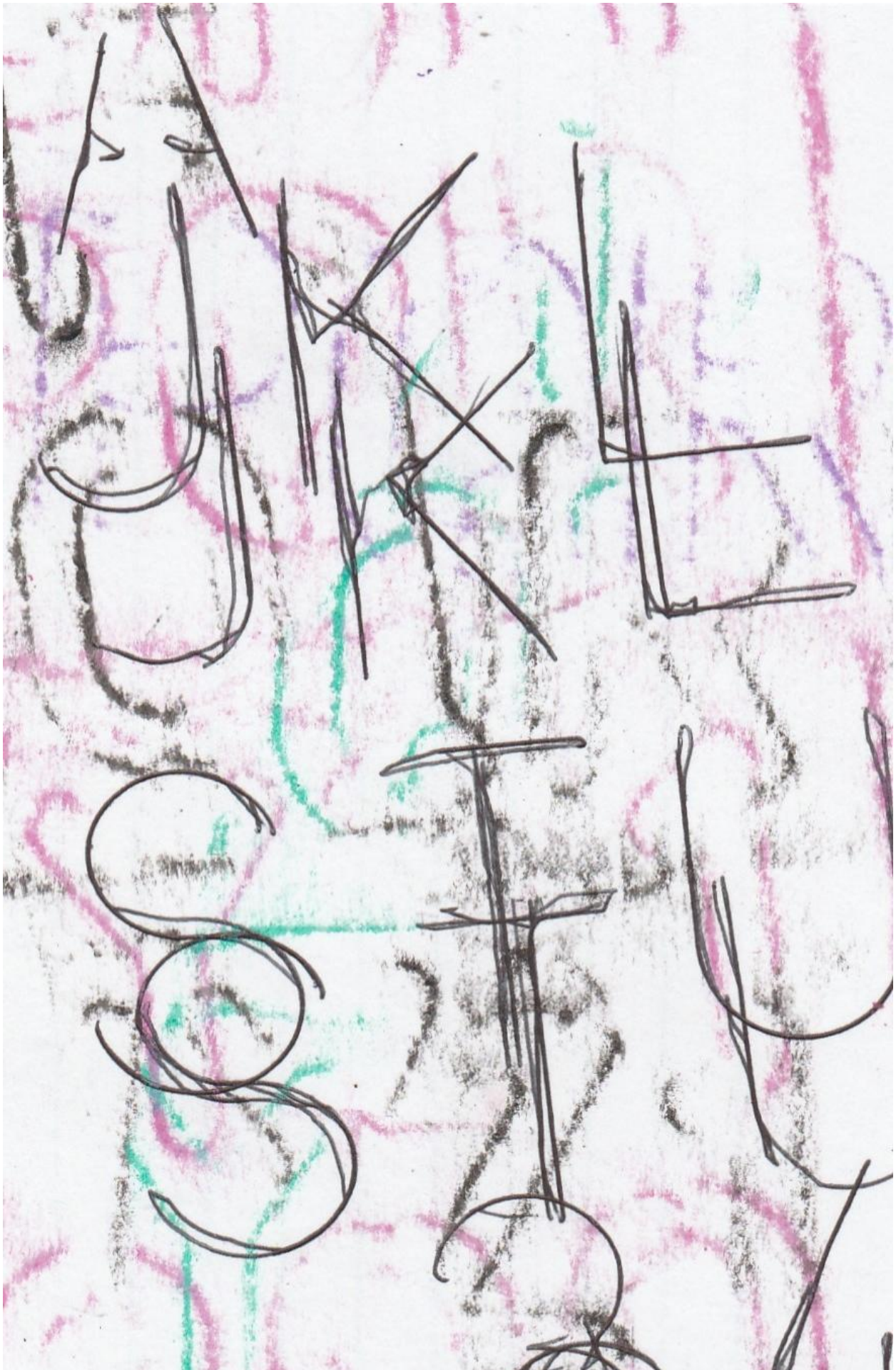


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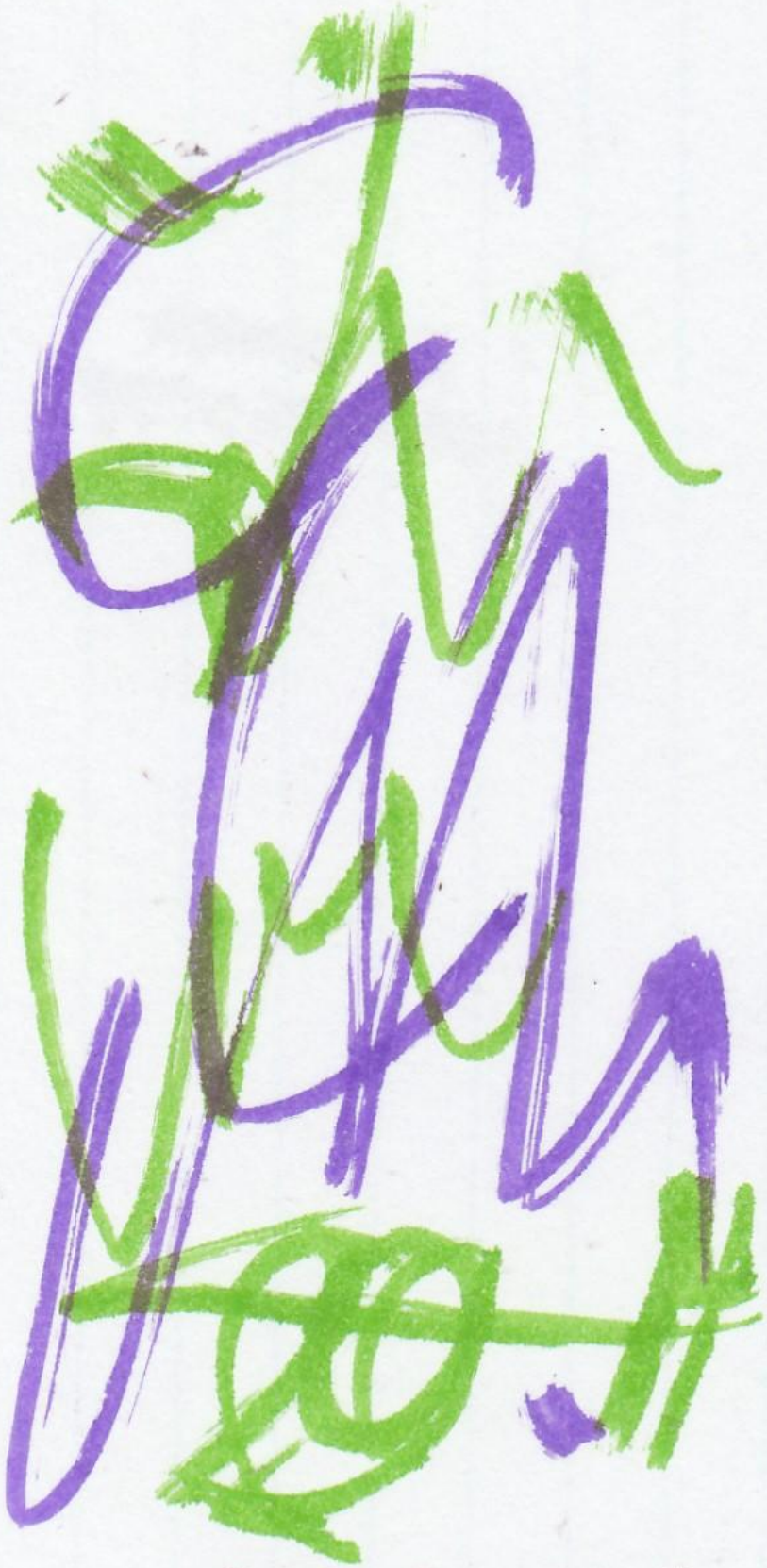

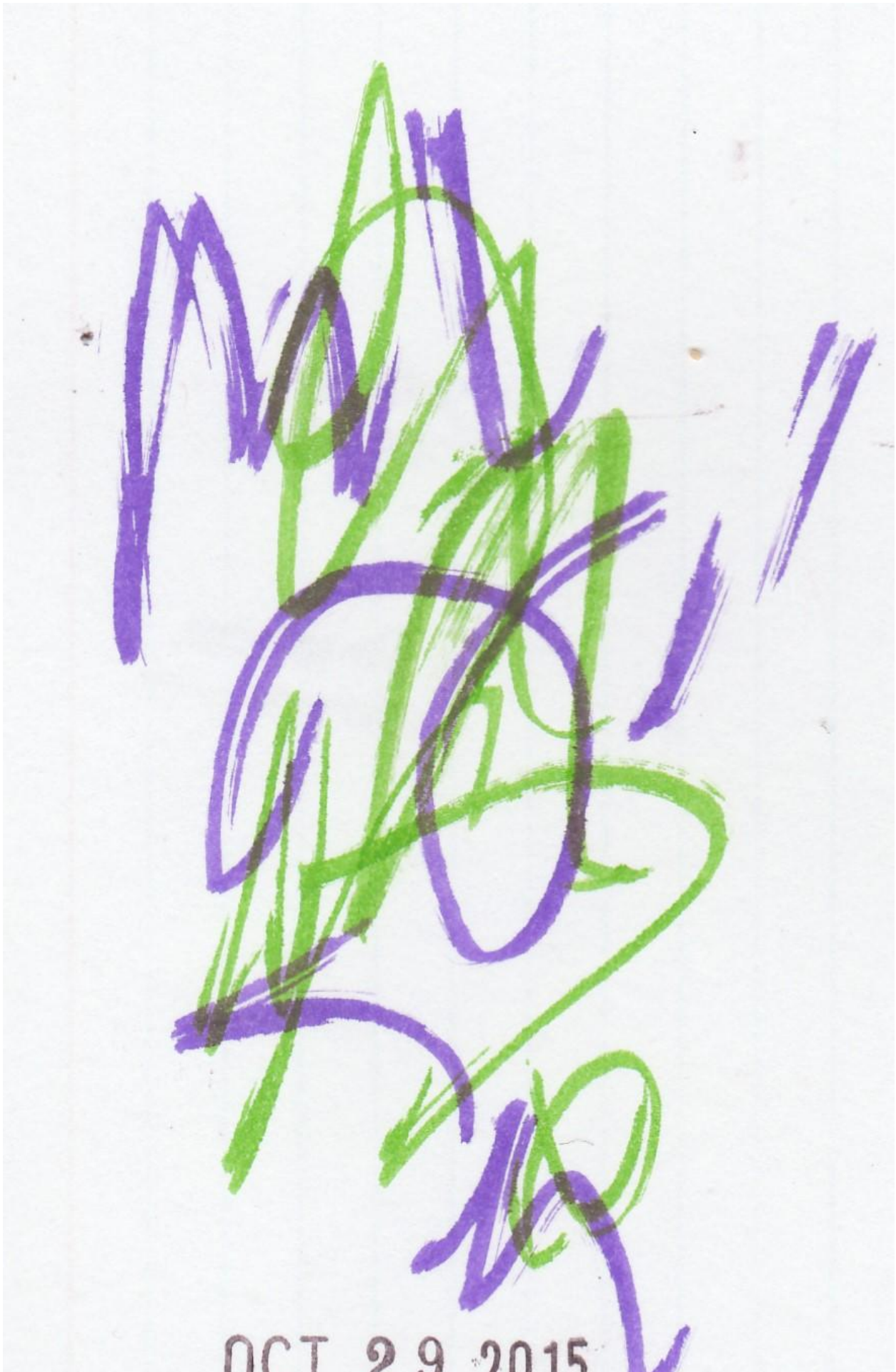
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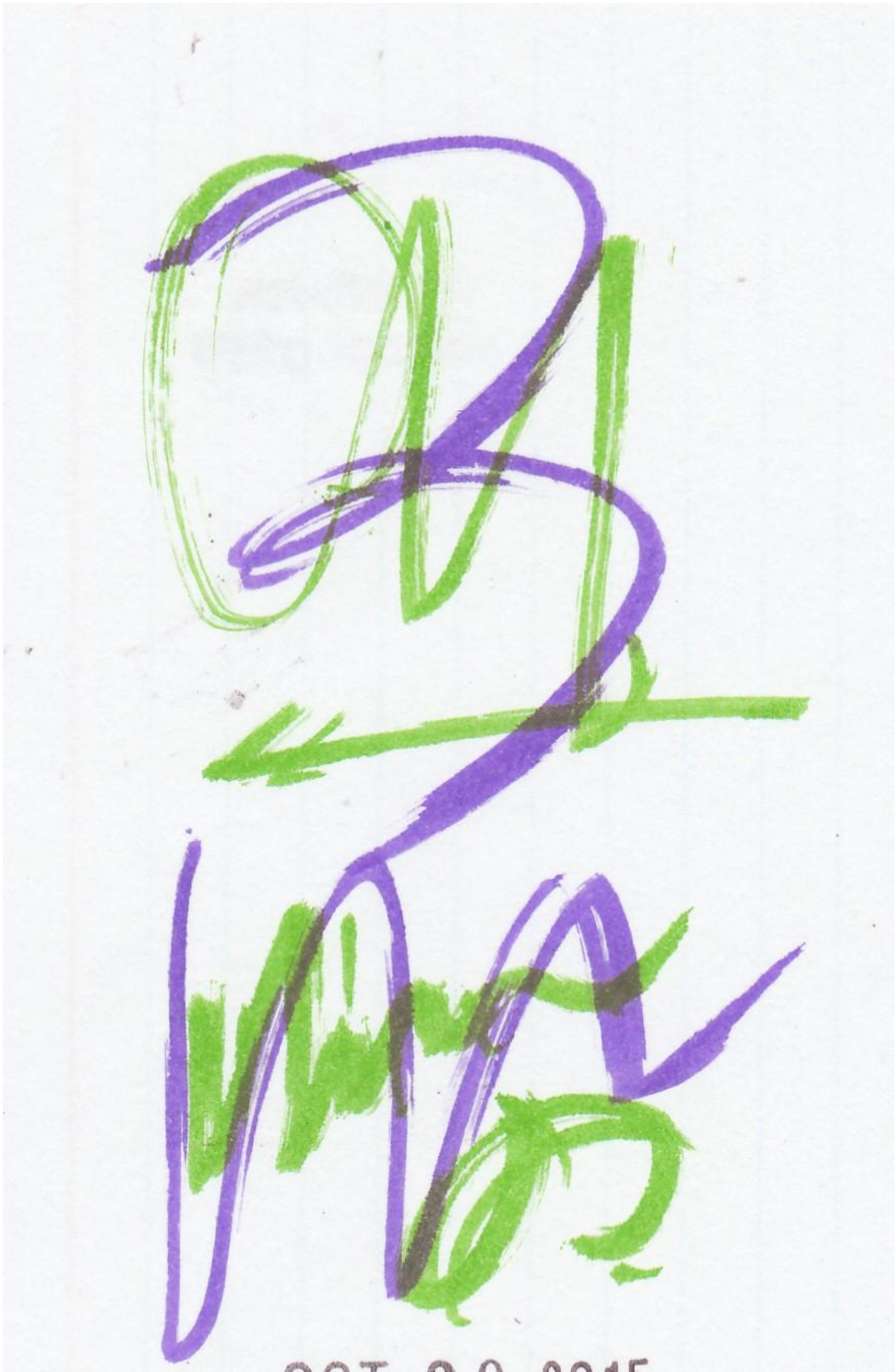


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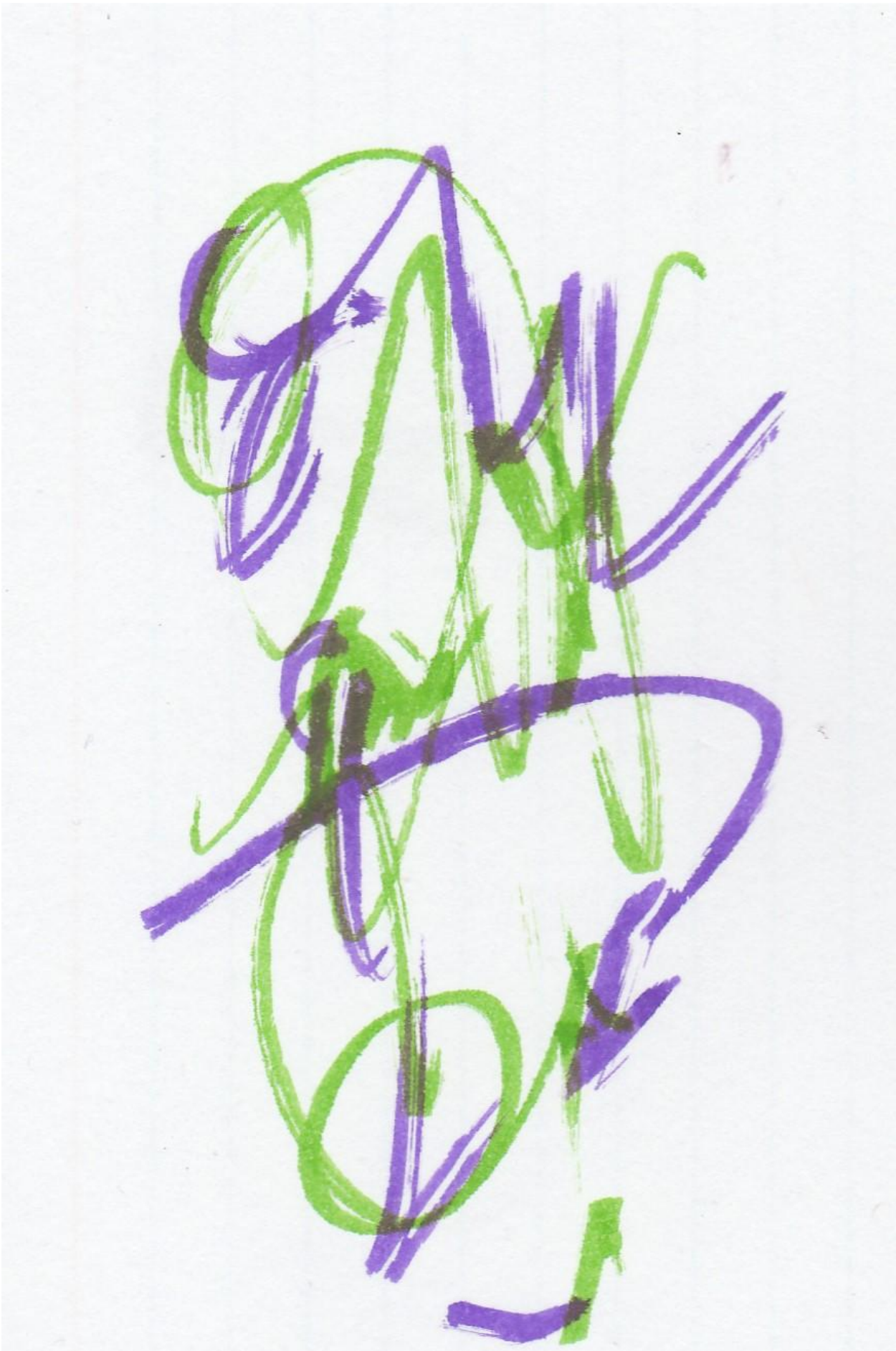

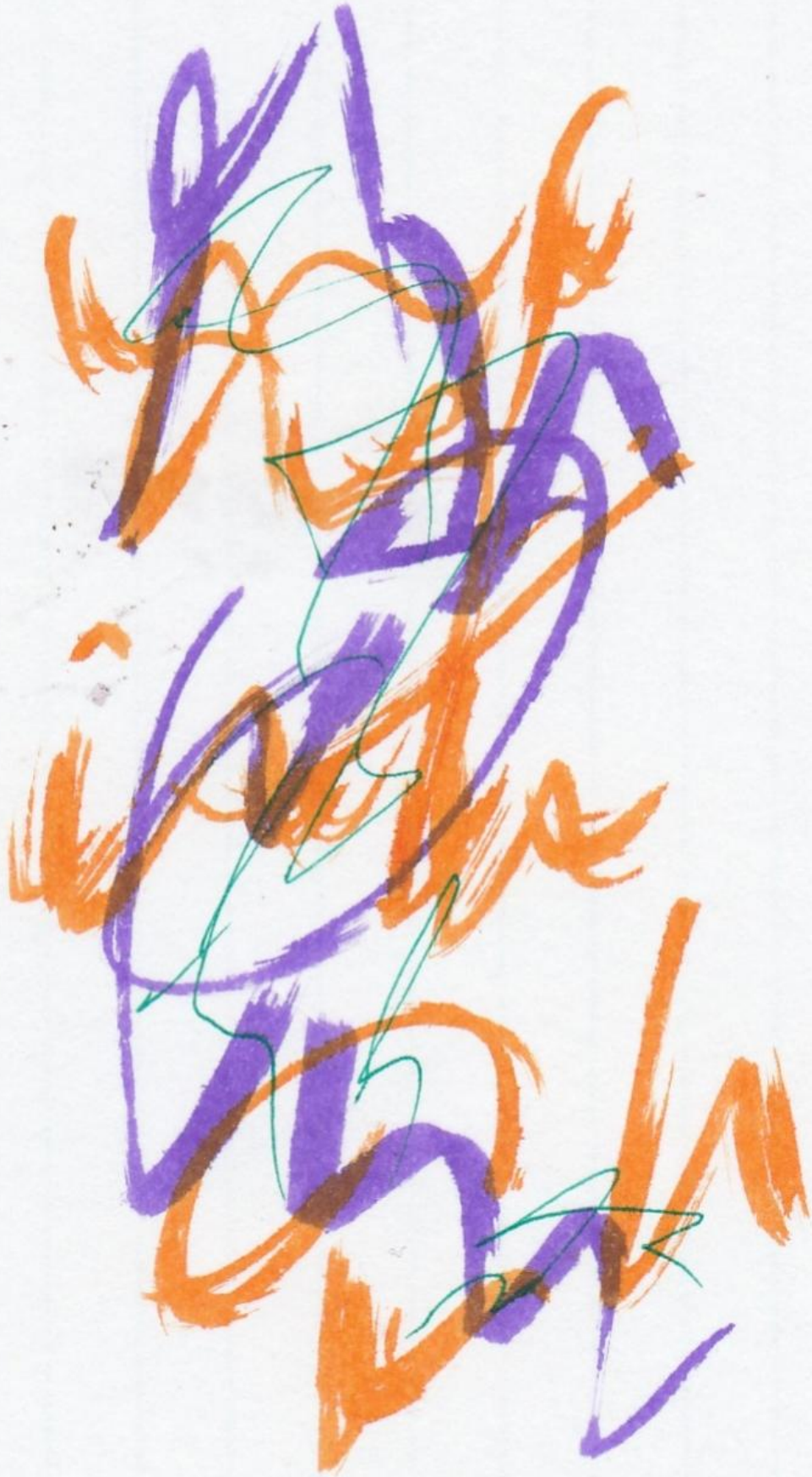

man "advances from one thing understood to another" through discursive reasoning. Nonetheless, both the intuition and the reasoning are intellectual, though reasoning has a certain measure of imperfection as compared with intuiting. Man, however, are not wholly deprived of intuitive knowledge since they can begin with principles, such as that the whole is greater than the part, which come to man *naturaliter—i.e.,* "everyone knows them."

Not that these principles are known innately; but, since man is intelligent, they are from the first present "in potential." Man needs the occasion to activate what is there. His mind "is at first like a clean tablet on which nothing is written"; but then he experiences the sensible; and, in consequence, what is all along present potentially in his intelligent life is now actualized, and he gains understanding. "With us to understand is to be passive." Bodily sensations provide the occasion, and the person, who is soul as well as body—*i.e.,* intellectual as well as sensitive—is illumined. Aquinas did not adopt the Platonic view that sensation and intellect are alien to one another in man's case. On the contrary, it is through sensory experience that the human intellect comes to understand, and it is to the soul's advantage that it is united with the body. Man's knowledge begins with sense experience, and it can do so because the sensory phantasma (or presentations of the mind) can be illuminated by active intellect, which then by its power abstracts intelligible species or concepts from them. The senses determine the particular, but intellect then receives the universal. Having received it, however, the human intellect—because of its lowly grade—is not powerful enough to gain immediate and full understanding, but it gains enough to proceed mediately by discursive reasoning.

So Aquinas demonstrates the necessity of sensory experience as providing particular sense images and of intellect as illuminating the sensory so as to abstract the universal. Just as in Aristotle, there are thus two aspects to human intellect: (1) the actualizing of the potential, which is the work of intellect as active, and (2) the passive reception of understanding, passive intellect. Aquinas made sure, however, that his own theory of knowledge, in spite of its recognition of the necessity of sensory experience, is not sensualism but is Rationalist in its recognition that knowledge is possible only on the possession of rational powers. Of all the Scholastics, Aquinas was thus the most like Aristotle in his epistemology, and he shared in his Rationalism.

The work of Duns Scotus and William of Ockham

The fortunes of Rationalism in Scholastic thought after the death of Aquinas can be traced in the philosophies of two scholars. At the turn of the 14th century, Duns Scotus, the great British Scholastic, sought to make clearer the character of a truly rational knowledge and maintained that arguments from effects to causes (*e.g.,* from the existence of the world to the existence of God) never provide conclusive proof. Man knows of God's existence through revelation; he can have no a priori proof—the only kind that, in Scotus' view, would be a true rational demonstration. William of Ockham, trained as an Oxford Franciscan, developed the same theme in the mid-14th century. Like Scotus he had no doubts about revelation and the faith, but he carried skepticism about Aristotle's and Aquinas' Rationalism well beyond Scotus. He asked whether the intelligible species are anything other than the philosopher's own mental creations. He even suggested that *intellectus,* whether active or passive, might be nothing more than an abstraction thought to be a real entity. Entities, said Ockham, should not be unnecessarily multiplied.

17th-century Rationalism. Descartes, Spinoza, and Leibniz—sometimes known as "the continental Rationalists"—mark the climax of precritical Rationalism.

Cartesian Rationalism. René Descartes is held to have been the father of modern Rationalism. His Rationalism lies in two features of his teaching, presented in his *Discours de la méthode* (1637; *Discourse on Method,* 1950): first, in what he says about method and, second, in his account of clear and distinct knowledge. Having expressed dissatisfaction with his education, he decided to subject everything that he had hitherto accepted as true to a methodical doubt in order to build a surer science of God, man, and nature. His main interest in the *Discourse,* it is clear, was in the latter, the science of nature. (His particular purpose was "to deduce rules in medicine of greater certainty than those at present in use.") Descartes, himself an expert mathematician, attributed the success of mathematicians in his day to the method that they employed. Mathematicians begin with the simplest truths, the foundational axioms, and pass step-by-step to knowledge of the more complex. He proposed to use "all that is best both in geometrical analysis and in algebra" to solve the problems of natural science. Each of these problems was to be divided into the simplest possible parts; and, beginning with these simples, by chains of easy reasonings, satisfactory conclusions could be reached. This meant, he admitted, assuming a specific order to exist in the natural world, although one cannot be sure that it does exist there. The aim is to project mathematical order into the physical world so as to enable the inquirer to understand it rationally. In every case the investigator should also check each link in the chain by careful enumerations and reviews. This procedure is rationalist in a specific way, for Descartes sought not merely any order, as all Rationalists do, but an order that is strictly mathematical.

Descartes's reliance on the mathematical method

Of fundamental importance to his whole epistemology is another rule:

> To accept nothing as true which I do not know to be such clearly (*evidemment*) that is, carefully to avoid precipitancy and prejudice and to comprise nothing more in my judgments than what presents itself so clearly and so distinctly to my mind that I have no ground whatsoever for holding it in doubt.

What is clear is "present and manifest to an attentive mind," and what is distinct is "precise and different from all other objects." The mind grasps the clear and distinct as infallibly true, so that an intuition of this order is the irrefutable answer to Skepticism. Descartes held that "*intuitus*" is

Descartes's notion of clear and distinct knowledge

> not the fluctuating testimony of the sense, nor the misleading judgment of a wrongly combining imagination, but the pure intellectual cognising (*conceptum*) of which an unclouded and attentive mind is capable; a cognising so ready and so distinct that we are wholly freed from doubt about that which we thus intellectually apprehend.

He who seeks for truth must not hope to find it in sense perception. He must "detach his mind" from the senses—nor again in blundering imagination but in a pure intellectual apprehension of infallible truth resistant to doubt. Here, then, at the opening of modern philosophy, is a definitive assertion of man's power to know indubitably by pure intellect, entirely by the light of reason.

Later, Descartes would seem to qualify the absoluteness and finality of *intuitus,* for he appeared to appeal to God's veracity as the final guarantee of the truth of what is known clearly and distinctly. Inasmuch as his argument—both to his own existence from his consciousness that he thinks (*Cogito, ergo sum*) and subsequently to God's existence—rests on intuition, it has been held that he is here involved in a vicious circle. His defenders, however, have held that no such circle is involved, that Descartes was pointing to the source of all man's powers in God and at the same time to his own failures, particularly his failures of memory. The failure, in some views, applies to the occasions on which he fails to intuit clearly and distinctly; for, whenever he does so intuit, in spite of his general fallibility, he attains infallible knowledge. There is, further, a relation between *intuitus* and deduction. Descartes speaks of both as part of the intellectual faculty of knowledge, which knows and never fails to know. Yet, Descartes has to admit that deduction is not as certain as intuition, for it is not simple. Intuition is simple as sheer apprehension and also in its object. It can only apprehend "the simple nature," for the latter alone is clear and distinct. Deduction, on the other hand, is complex. Yet, it too, being intellectual, can give man the truth, as long as he does not will to err.

But the problem, then, is how to relate deduction to the intuitive apprehension of simple truth—which is what, in Descartes's view, knowledge essentially is. Deduction is

lithium-tellurium. For larger urban vehicles, lighter batteries also are required, but it is possible that nickel-zinc, nickel-cadmium, or even lead-acid can be successful with suitable development. For special vehicle and aircraft applications, where a higher cost can be justified, the silver-zinc cell appears promising, and development of this type of battery to make it capable of deep discharge and long cycle life is likely to continue.

Another secondary battery, still under development but worthy of mention, is the sodium-sulfur battery that uses liquid sodium as one electrode, a solid aluminum-oxide electrolyte, and a sulfur and sodium sulfide mixture on the opposite side. A carbon current collector completes the cell. Current is produced when liquid sodium forms ions that migrate through the aluminum oxide and react with sulfur. The cell is reversible and has a high-energy capacity for its weight. Although it operates only at temperatures of about 580° F (250° C), its lightweight characteristics make it a contender for the battery of an electric car of the future. There are other high-energy batteries of this type also under development, one of which uses lithium and chlorine as the reactants.

After the initial surge of interest in fuel cells in the early 1960s, the only real applications to emerge have been for powering manned spacecraft. For longer missions to more distant planets, solar or nuclear generators are more appropriate, but regenerable or reversible cells may be developed to store energy produced by these devices. For earth-orbit missions, and for lunar laboratory applications, hydrogen–oxygen cells are likely to remain in use.

The earlier promise of the fuel cell as a power source for automobiles is now recognized as a long-term prospect, and although research will continue toward this, it is likely to be at a low level. Increasing interest is being shown in static electrical generation from natural gas and liquid petroleum fuels for relatively small, local power stations, and the development of these for small communities will continue. (D. A.)

Magnetohydrodynamic devices

Magnetohydrodynamics is the study of the behavior of electrically conducting fluids (electrolytes, liquids or gases) in the presence of electric and magnetic fields. Magnetohydrodynamics today is primarily concerned with gases. At ordinary temperatures and pressures, gases are composed of electrically neutral atoms or molecules, and do not conduct electricity. At temperatures of several thousand degrees or above, however, the motions of the gas particles are violent enough to dislodge some of the outer electrons from the atoms. The electrons thus freed and the resulting positive ions are easily made to move by an electric field; such ionized gases (plasmas) are usually good conductors of electricity. Magnetohydrodynamic (MHD) devices generate electric current by the interaction of an electrically conducting fluid, such as a plasma, and a magnetic field. Closely related are electrogasdynamic (EGD) devices, which generate electric current by the interaction of an electrically insulating, or nonconducting, fluid carrying charged particles or ions, and an electric field.

EGD devices

General considerations

Principles of operation. Direct energy conversion, as performed by MHD and EGD devices, involves the direct transformation of heat or radiation into electricity, rather than first to mechanical energy, and then to electricity. In a conventional power plant, the energy stored in a fossil or nuclear fuel generates heat to produce steam, which in turn drives a generator to produce electricity. By contrast, energy in MHD or EGD devices is transformed to electricity directly from the thermal and kinetic energy of the fluid. Only the fluid inside the MHD or EGD device is in motion; the device itself has no moving parts. Because of this, the device can operate at extremely high temperatures, which would destroy the metals and lubricants in a conventional steam turbine.

Basic principles

MHD generator operation. Figure 46 illustrates the basic principles of a magnetohydrodynamic (MHD) electrical generator. The conducting fluid passes through a duct that

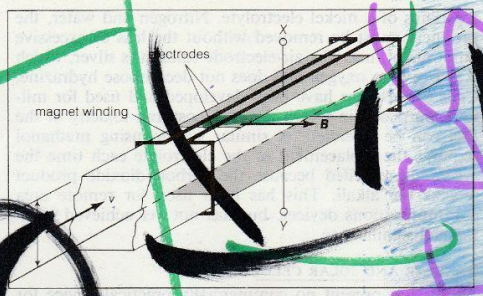

Figure 46: Operating principles of a magnetohydrodynamic electrical generator (see text).

has two opposite conducting walls (electrodes) and two opposite insulating walls. A strong magnetic field (B) is established at right angles to the duct. As the conducting fluid flows through the duct and the magnetic field with a velocity v, it generates an electrical voltage across the electrodes xy. The actual voltage generated depends on the velocity of flow, the strength of the magnetic field, and the height, h (or diameter) of the duct. This voltage could measure velocity of flow and the device would become a flowmeter.

If an electrical load of some kind, such as a light bulb, is connected across the electrodes, current will flow through the load. Inside the duct, a direct current flows between the two electrodes. This current exerts a retarding force on the fluid, and work must be done by the fluid to overcome this force. The work thus extracted from the fluid is converted to electricity. The retarding force is called electromagnetic braking.

The reverse effect can also be made to take place. If an electric current is driven through the fluid by an external battery or generator, a force is exerted on the fluid and the device becomes a pump. This technique may be applied effectively to pump liquid metals such as mercury and molten sodium.

EGD generator operation. An electrogasdynamic (EGD) device also extracts power directly from fluid flow, but the principles of operation are different (Figure 47). Basically, the fluid flow is used to force an electrical charge, in the form of ions or charged particles, from a region of low voltage to a region of high voltage, against an electric field E. If the ions are collected at the far end of the generator, a current, I, can flow through a load. The electrostatic retarding force, F, on the fluid is qE per unit volume, in which q is the charge density and E the collector electrode voltage divided by the distance between electrodes, and the flow does work against this force. If, instead, the electric field is reversed, the ions are forced ahead more rapidly and the device becomes a pump. The charged particles are formed by passing the fluid through an electrical discharge in which the voltage is high enough to produce ionization.

Historical background and applications. The basic principles of magnetohydrodynamics and electrogasdynamics have been known for over a century. The essential features of the interaction between an electrically conducting fluid and a magnetic field, and of electrostatics, were described

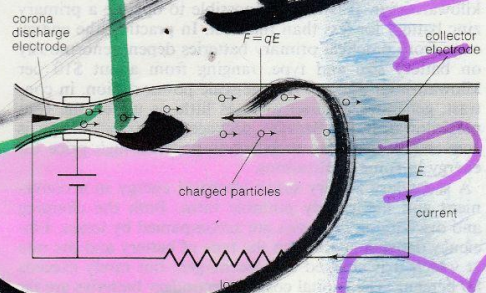

Figure 47: Operating principles of an electrogasdynamic converter (see text).

Good reasons theories

Mixed metaethical and normative theories

In addition to the deontological and teleological normative ethical theories that have been considered above, some 20th-century philosophers have presented theories of a mixed character. While their theories have obvious similarities to one or another of the normative ethical doctrines, they are presented as being logical or conceptual, as primarily explicating the meanings of such words as moral or ethical or ought, as well as the nature of moral reasons or moral reasoning. Thus, while the theories are presented as mainly or exclusively metaethical, their authors derive substantive normative ethical conclusions from them.

Material reasons. These theories focus on the question of logically good reasons in ethics, reasons of two kinds: material and formal. The material kinds of reason have a definite moral content and take one normative ethical position as against another; yet, the philosophers who propound them set them forth as deriving from definitions of what constitutes ethical or moral reasons in general. Thus, Stephen Toulmin, a British-American philosopher of science and of ethics, presented as his main problem to inquire into "the kinds of change in behaviour at which reasoning must be aimed, if we are to call it 'moral' or 'ethical' "; and his solution was that "the 'function' of ethics" is "to correlate our feelings and behaviour in such a way as to make the fulfillment of everyone's aims and desires as far as possible compatible," so that "what makes us call a judgment 'ethical' is the fact that it is used to harmonise people's actions. . . ." It is difficult to avoid the suspicion that a substantive view of moral goodness or rightness as consisting in social harmony is here being set forth as part of the very meaning or definition of ethics or morality. On this view, it becomes logically impossible to refer to ethical egoism as an ethical theory or to the various nationalistic, racialist, elitist, and other particularistic moralities. The view seems to settle by definition what preceding moral philosophers regarded as the central problem for normative ethical argument: how it can be established that one system of normative ethics is rationally superior to its rival systems. Similar considerations apply to the statement of Kurt Baier, a U.S. moral philosopher, that "moral rules must be for the good of everyone alike," especially as this is presented as part of the definition of "the moral point of view" and, hence, also of "moral reasons."

Mixed formal and material reasons. The other kind of reason presented by the 20th-century writers who make "moral reasons" central to their theories is formal, consisting in the principle of universalizability discussed above. Since this principle taken by itself gives no moral results, the "good reasons" writers combine it with various material considerations. Marcus G. Singer, another U.S. moralist, combined it with the negative Utilitarian consideration of the bad consequences that would ensue if one were to perform certain kinds of actions. R.M. Hare combined it with the consideration of human inclinations, consisting mainly in their self-interested desires. The result of this combination in Singer's doctrine yields a line of argument that says that, if the consequences of everyone's doing a certain kind of action would be disastrous, then no one ought to do that kind of action. The corresponding result in Hare's doctrine is a line of argument that may be divided into three steps. First, a person holds that he ought to perform a certain kind of harmful action toward someone else because the latter has some quality. Second, he recognizes that, if he, the prospective agent, were to have that same quality, then it would be right for him to have to undergo that same kind of harmful action himself. Third, since, however, his inclinations are against such undergoing, he comes to judge that he ought not to perform that action on his intended victim.

Bad consequences and human inclinations

Each of these positions makes suggestive points about the logic of moral argument. One of their difficulties, however, is that, in each case, the material considerations that they combine with the formal one are contingent on men's variable beliefs or inclinations. People may differ in their beliefs about what consequences are disastrous, and they may also differ in the extent to which they are willing to undergo counterinclinational actions. The doctrines of Singer and Hare hence provide no way of arguing against the person who denies that certain consequences, such as colonial war, are disastrous or who persists in certain judgments and actions even when their application to himself would go against his own self-interested inclinations. This means, for example, that the fervent nationalist or racist cannot be proven to be morally wrong by the above kinds of argument.

The normative ethical theories that have been discussed in the last two sections have obvious ramifications for the social problems of our time. The issues of race, poverty, war, crime, ecology, and so forth impinge on some of man's most important goods and bear vitally on the duties of distributive justice and on corresponding rights. The moral philosopher's essential contributions to these problems comprise both clarification and justificatory argument. The contributions have important implications for individual action and social policy.

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vibrating object (as a string), a point, line or other part that has very little, or no, vibratory motion. 4. ASTRONOMY. Either of two points where the orbit of a celestial body appears to intersect another orbit or plane, such as the ecliptic.

A lymph NODE *may swell if it becomes infected in the process of filtering lymphatic fluid.*

nodule \'näj-(,)ü(ə)l\ *n.*
1. EARTH SCIENCE. A small lump or mass, found in a variety of sedimentary rocks, that differs in makeup from the main rock and apparently was formed after the rock was deposited; a small concretion. 2. BOTANY. Any small knoblike growth on the stem or other parts of a plant, such as growths on the roots of legumes caused by nitrogen-fixing bacteria.

Flint commonly occurs as a NODULE *in chalk, limestone and dolomite.*

nonagon \'nō-nə-ˌgän\ *n.*
MATHEMATICS. A polygon having nine sides.

Each central angle of a regular NONAGON *is equal to 40 degrees.*

nonconductor \ˌnän-kən-'dək-tər\ *n.*
PHYSICS. A substance that does not readily transmit such energies as heat, electricity or sound; also called insulator.

Rubber, a NONCONDUCTOR, *is used as electric insulation.*

nonconformity \ˌnän-kən-'för-mət-ē\ *n.*
EARTH SCIENCE. A surface, usually irregular, between a younger sedimentary rock layer and an older mass of igneous or metamorphic rocks; see *unconformity.*

A NONCONFORMITY *represents a period of time during which erosion took place or no sediments were deposited.*

nondisjunction \ˌnän-dis-'jəŋ(k)-shən\ *n.*
BIOLOGY. The failure of two chromosomes to separate during the reduction division of cells.

NONDISJUNCTION *influences the characteristics which will be inherited by an organism.*

nonmetals \(ˌ)nän-'met-ᵊlz\ *n.*
CHEMISTRY. Chemical elements that are not good conductors of electricity and heat. Nonmetals tend to gain electrons in chemical reactions and thereby form negative ions. They are re-

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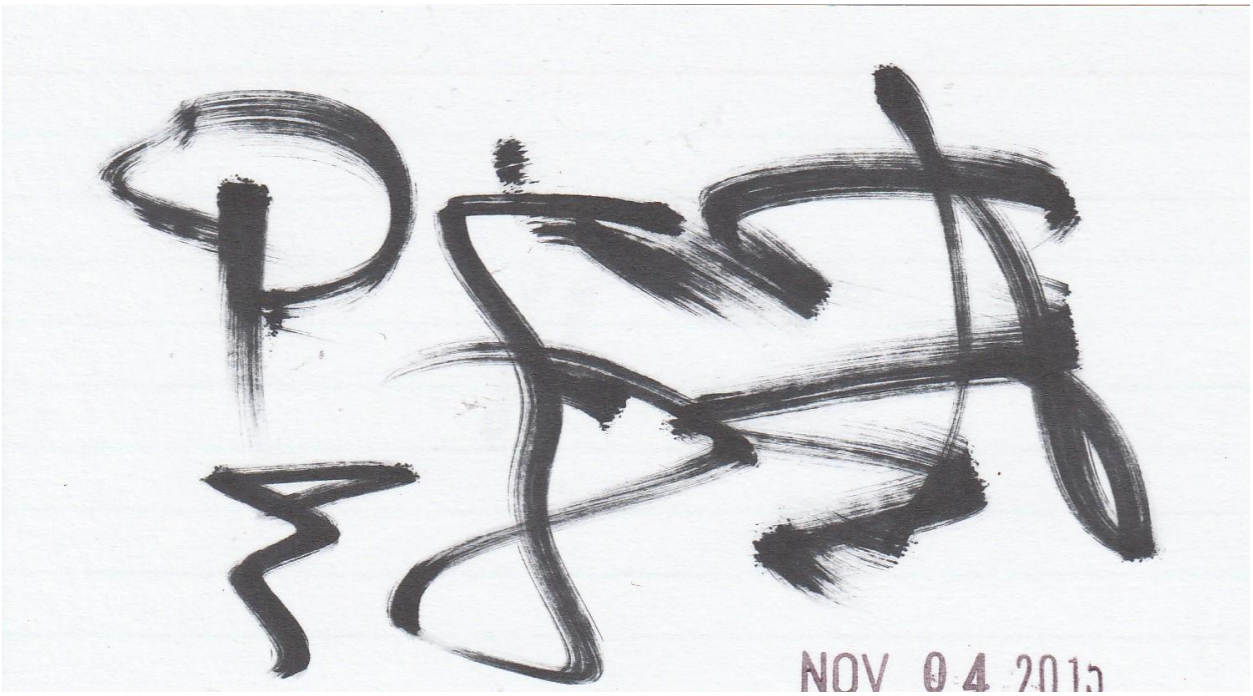
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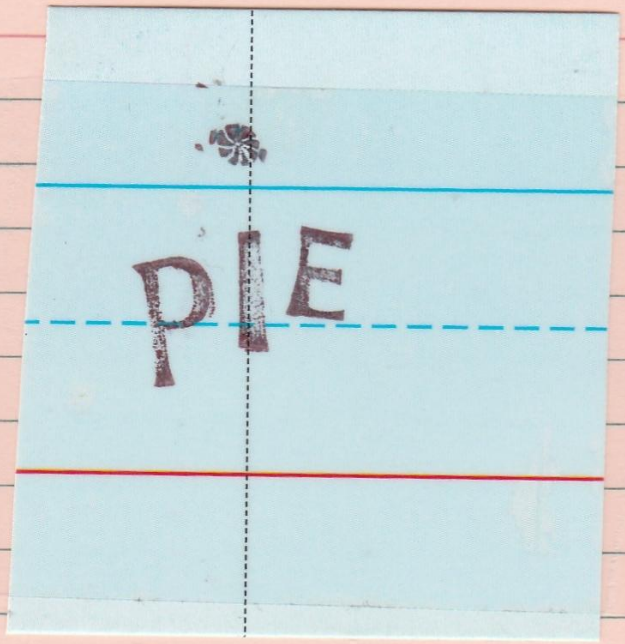

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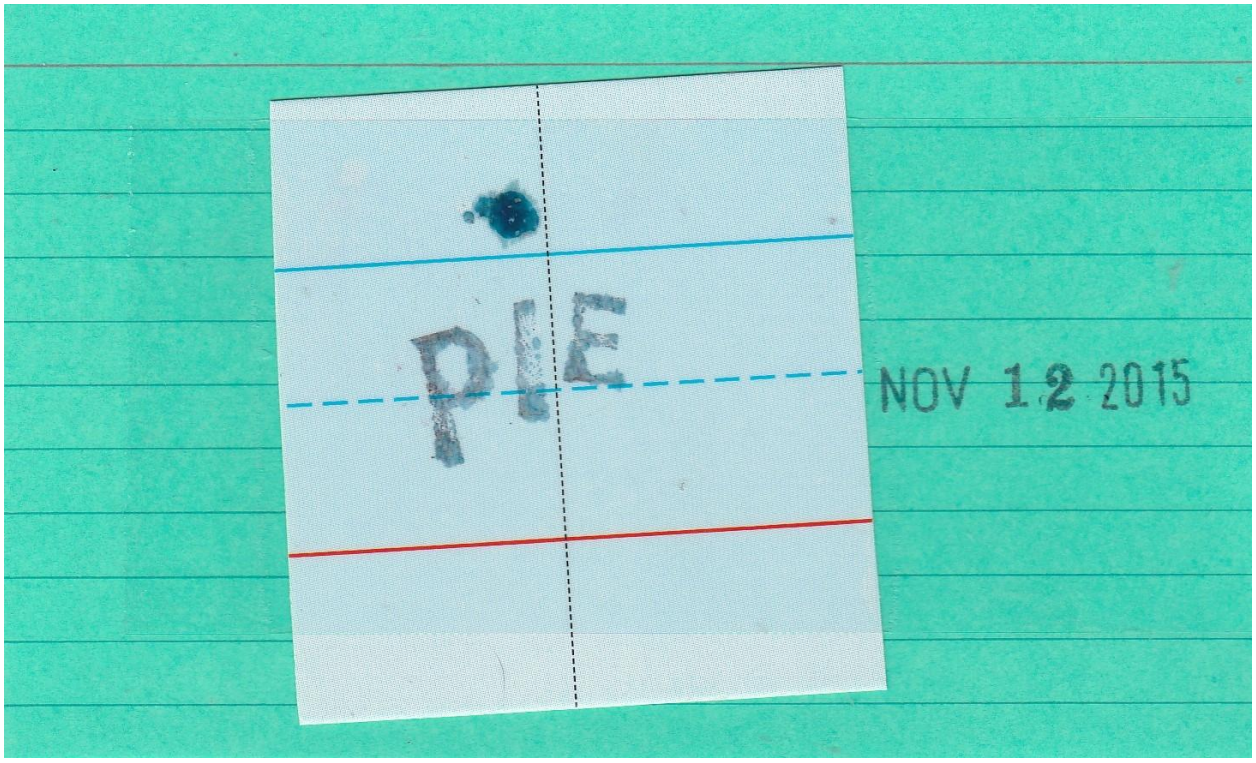
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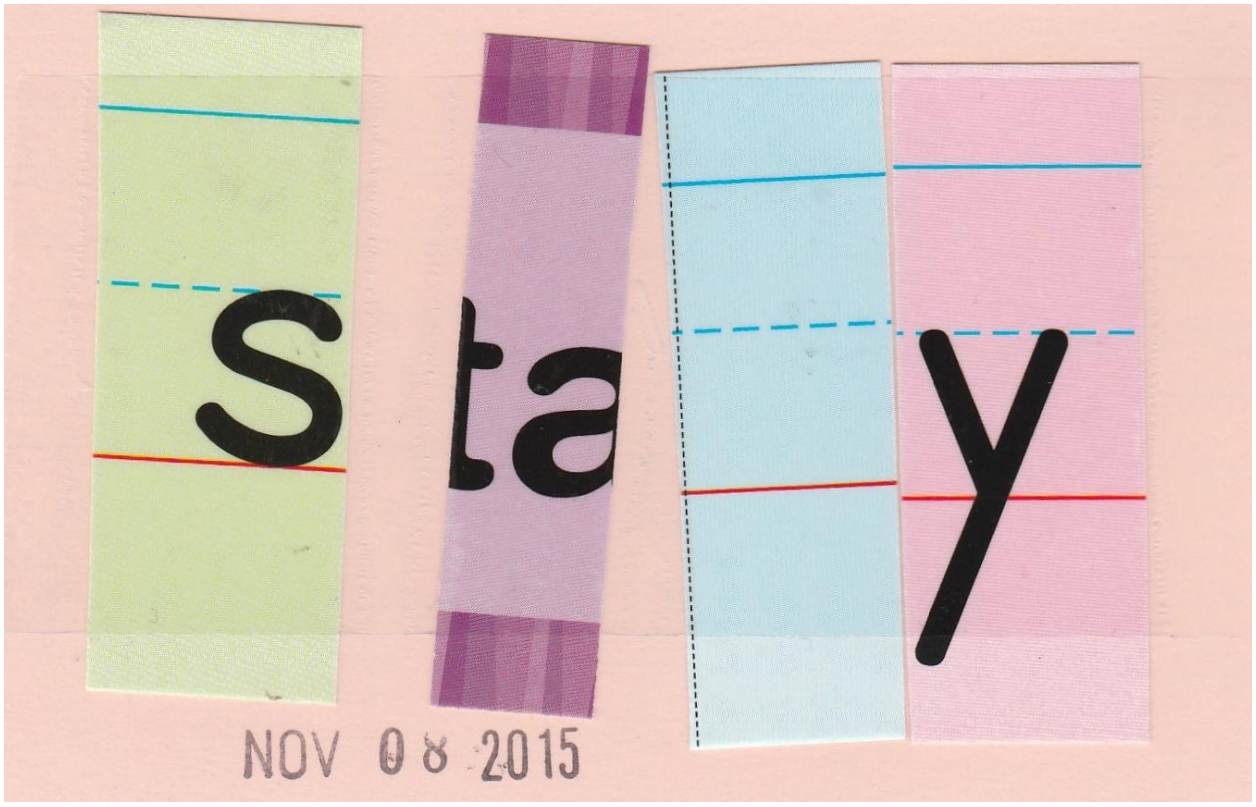
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